NATIONAL CAR BUILDER

VOLUME XI.
NUMBER 8.

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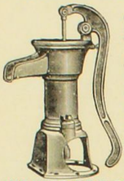

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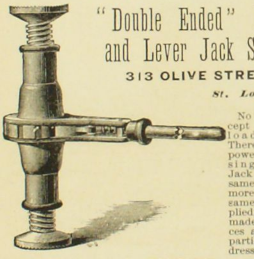

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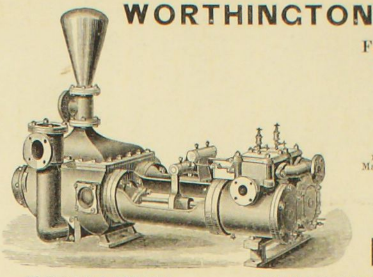

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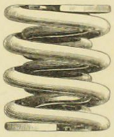

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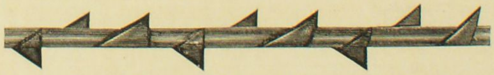

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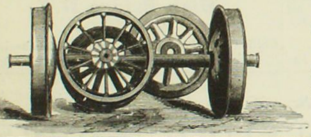

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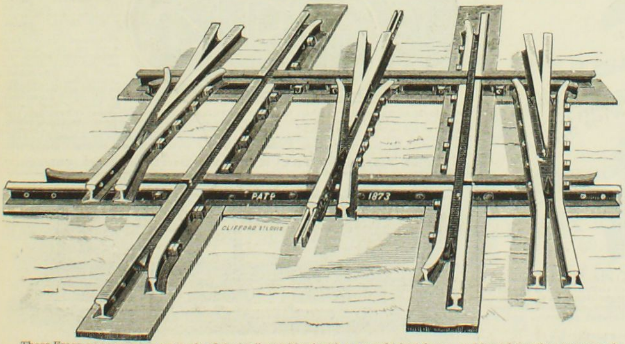

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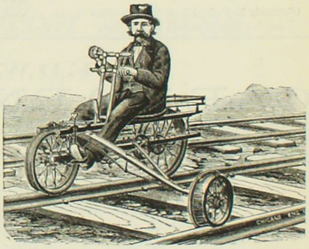

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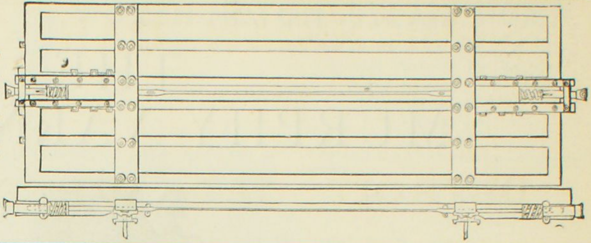

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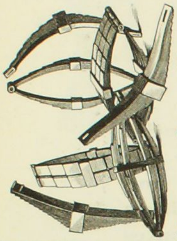

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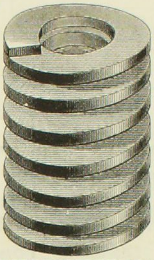

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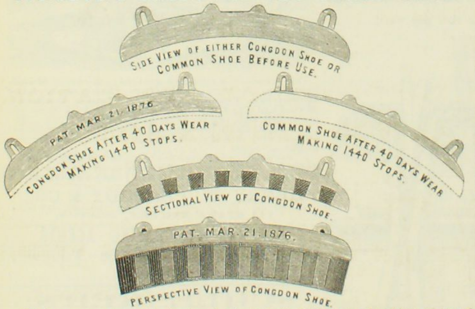

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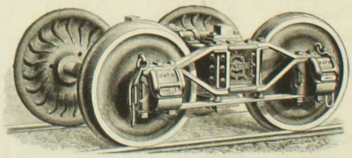

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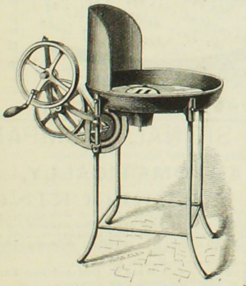

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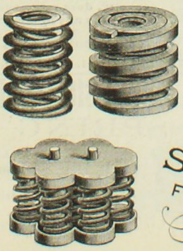

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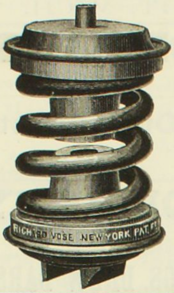
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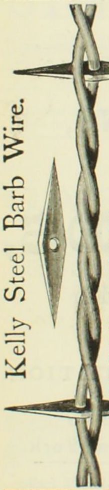

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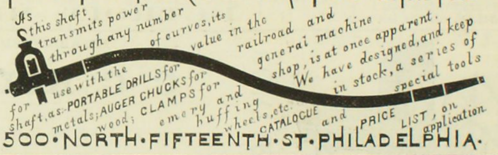

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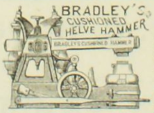

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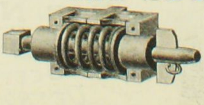

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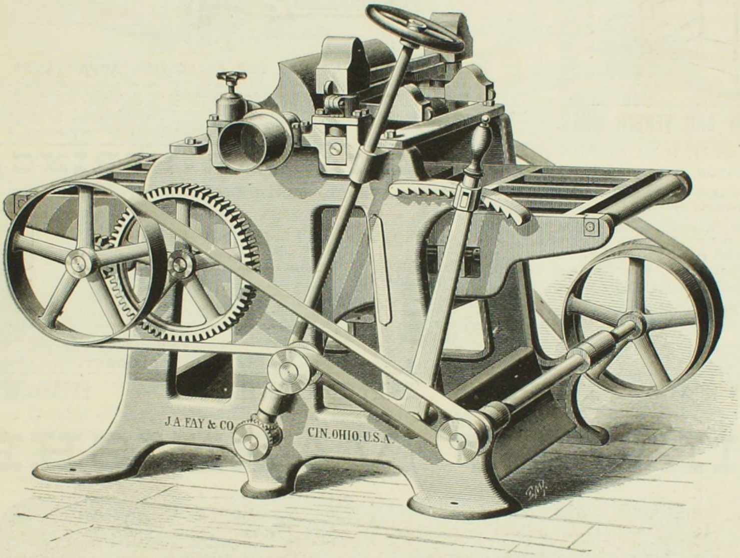

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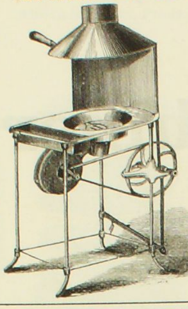

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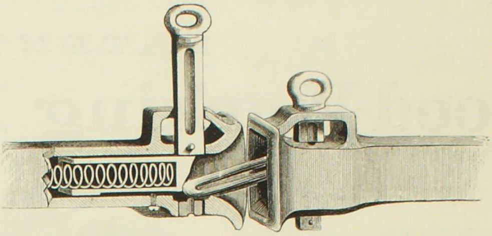

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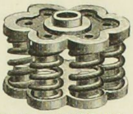

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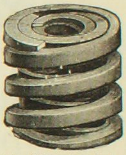

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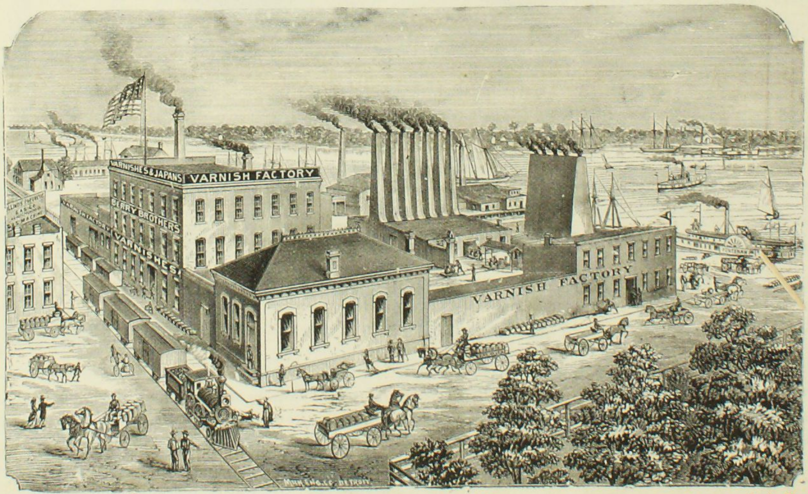

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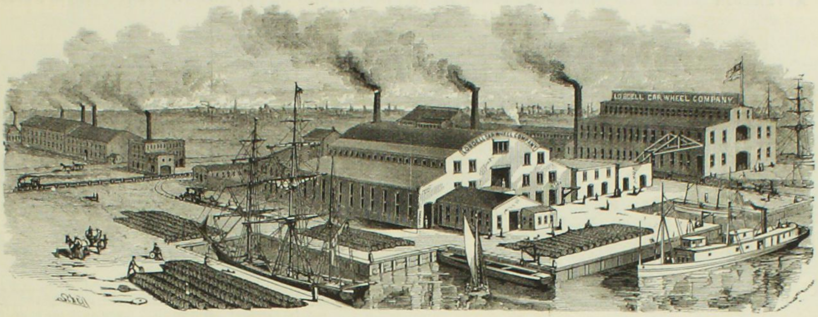
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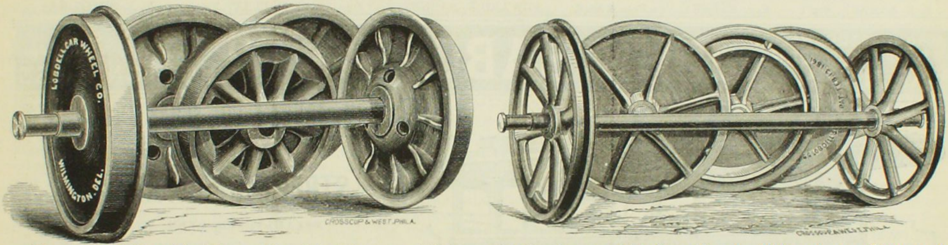
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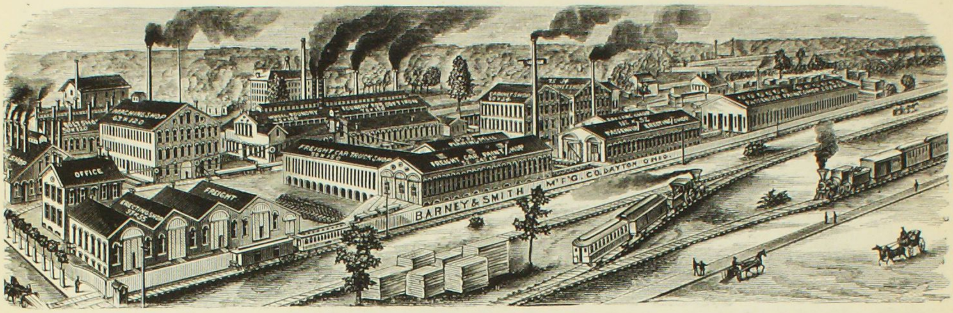
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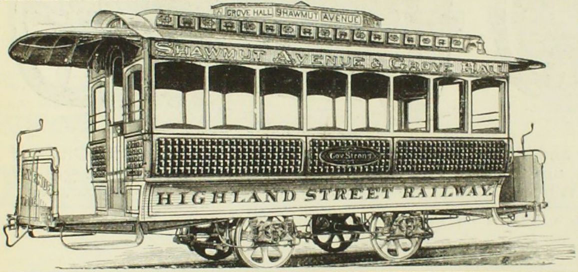

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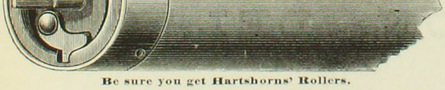

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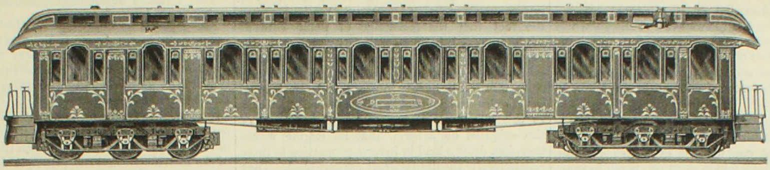

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VOLUME XI.
NUMBER 8.

AUGUST, 1880.

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The Construction of Car-Trucks.

[From the Railroad Gazette.]

It is probably quite within the limits of exact truth to say that there is no portion of the mechanism of railroads which, in relation to the service it must perform, is as rude and imperfect in its construction as are car-trucks. The fact, too, that they form the distinctive feature of American rolling-stock, gives to their imperfections somewhat of the character of a national discredit. For years we have assumed the superiority of our “bogie system,” as our Anglican cousins phrase it, and have apparently trusted so implicitly to the advantages of the “system,” that we have neglected to improve the design, construction and workmanship of its component parts. That it is susceptible of great improvement, there can be no doubt, as will appear very plainly if we reflect a little on the work which a car-truck must do, and then observe the mechanism employed to do it.

Thus, let us take the wheels. It would seem as though the first consideration would be that they should be round, and concentric with the axles. Instead of this being the case, those who have investigated the subject report that in cast-iron wheels taken at random, they have found the most surprising deviations from a true circular form and from concentricity with the axles.

In nearly all other machinery of which rapidly-revolving wheels form a part, the utmost care is taken to balance them truly. Until very lately, this has not received any attention whatsoever, and car-wheels have been put into service without even so much as thinking whether they were balanced or not. That two rough castings, usually made with one or more internal cavities cored out, should not be in a state of equilibrium when attached to an axle is not surprising, and it is therefore not to be wondered at that recent tests should reveal some very serious causes for disturbance in the rotary motion of cast-iron car-wheels.

It is apparent, too, that if two wheels on the same axle are to roll in a straight line they should both be of the same diameter. As a matter of fact, it is found that often a considerable variation exists in the sizes of wheels which form a pair. The effect of this on the resistance, and on their wear, can readily be imagined.

To roll in a straight line with the least resistance, the axles of the two pairs of wheels which form a truck must be parallel with each other, and the wheels on each side must be in the same place, so as to “track” the one with the other. Not only must the axles be parallel, but their contour, or the figure of which their two centre lines form opposite sides, and which is completed by lines uniting the ends of the axles, must be rectangular, and not of a trapezoidal form. That is, the truck-frames must also be parallel to each other, and at right angles to the axles. If the truck is not “square,” as it is termed, one or more of the wheels will be inclined to the rail, and the flanges will run against it, thus increasing both the resistance and the wear.

As a matter of fact, a large proportion of the trucks in use are not “square.” If a careful examination was made of those found under a miscellaneous number of cars, it is believed that the most surprising deviations from their correct geometrical position in relation to each other would be discovered, a fact of which the frequent wear of wheel-flanges is the evidence.

If journal boxes and bearings are carefully examined, it will also be found that their whole construction is one of the most imperfect pieces of mechanism in use. One of the chief purposes which they must perform is to hold the axles in their proper position. Let us see how much probability there is that they will do this. A journal-box is simply a rough casting, made with a more or less rude core cast in it. The journal-bearing is also a rough casting, seldom or never finished, excepting on the surface which bears on the axle. It is placed in its position in the box, where it is held by lugs, which must allow of more or less “play,” so as to make it certain that it will always enter. The “play” is also required so that the bearing may adjust itself to the journal in any position. It would, of course, be possible to make a bearing which would be adjustable, but which would, at the same time, hold the axles in exactly the right position. The ordinary journal-bearing is, however, not of this kind, but must be made smaller than would be required for a good fit in its seat, in order that it may always enter, and that it may not “bind” on the journal. The probabilities that the axles of trucks made with this sort of rude contrivance will be “square,” and the wheels in line so as to “track,” may be imagined, and may be shown practically in any railroad yard where a considerable number of miscellaneous cars are collected together.

The dust-guard, too, is an equally imperfect device. Its object is to prevent the oil from leaking out and the dust from entering the box through the opening in the back which receives the axle. To do this, there should be a joint for the axle to turn in, which would prevent oil from leaking through. The contrivance generally used for this purpose consists of a piece of leather, wood or vulcanized fibre inserted in a rough recess cast in the box, and with a hole just large enough to receive the axle. No attempt is made at fitting the packing, as it is called, nor provision made for its wear. It should not be surprising, then, that it fulfills its purpose only partially, which is shown by the fact that car-trucks are nearly always covered with oil and grease which has leaked out of the journal-boxes, and in fact the marks of such leakage are generally trailed on the track from one end of a railroad to the other. When oil can leak out, dust can, of course, leak in; and if the combined loss due to the leakage of oil and the abrasion of journals and bearings, which is due to the ineffectiveness of dust-guards, could be counted, it would sum up to an enormous aggregate.

So long as inequalities in railroad tracks exist, car-trucks must be subjected to both vertical and lateral shocks and blows. The side concussions are communicated to the rails by the flanges of the wheels, and to the latter through the journal-bearings and axles. The consequence is that the journal-bearings must resist a great deal of lateral strain, and are subjected to constant wear from that cause. Any intelligent mechanic who will carefully consider the nature and severity of these concussions, and will observe their effect on journals and journal-bearings, must be convinced that these parts form a very imperfect contrivance for doing the work or for resisting the wear to which they are exposed. The several forms of collarless journals with end bearings seem to possess advantages, and to provide more effective means for resisting this wear, but up to the present time they have not been very extensively used.

If the truck or “bogie” system of building cars and locomotives has any merit, it is due, of course, to the fact that the trucks will turn around their centre-pins, or king-bolts, so as to adjust themselves to the curvature of the track. If they do not turn freely, the advantage of the system is defeated in somewhat the proportion of the resistance of the parts to turning. That this resistance is often very considerable is indicated in a variety of ways. The surfaces on which the car must turn—that is, the centre-plates and side-bearings—are seldom made with any appliances for oiling them or for retaining oil. It is also impossible to inspect the centre-plates to see whether they are oiled without raising up the car-body. The result is that they get so dry that, with the great weight they must bear, the surfaces “seize,” as English engineers say.

Another defect which seems to exist in the construction of cars with trucks, is that there is no efficient provision for distributing the load of the body on the trucks in passing over lateral inequalities of the track. The “three-legged principle,” as it is called, derived its name from the fact that a three-legged stool or tripod will rest firmly on any surface, however uneven. In locomotives, where it is important that the wheels should have a uniform bearing, this principle is generally applied, that is, the running gear is so arranged that ultimately the weight of the engine rests on three points. The same plan is adopted for tenders. The back trucks are usually made with side-bearings and the front ones with center-bearings, so that the weight of the frame or body of the tender rests on these points. In car construction, however, this principle is not adopted, but a sort of indefinite compromise is the usual practice; that is, both trucks are made with centre-bearings, and the side-bearings are so arranged that when the car body is in its normal position it does not rest on them, but a little space is left between them and the body so that if any rocking or lateral motion occurs to the truck or the body, the movement of the latter will be arrested by the side-bearings. It can readily be seen that if one truck should be inclined sufficiently, the car body will then be supported on its diagonal corners, the effect of which is to twist or "rack" its whole framing. If one truck were made with side-bearings and the other with a centre-bearing, each of them could then adjust themselves to vertical inequalities in the track without subjecting the body to undue strain.

If we bear in mind the fact that all railroads consist of parallel iron bars, laid a definite distance apart, and that cars consist of vehicles whose wheels have flanges which must run between these bars and are the sale means by which the wheels are kept on the rails, it would seem as though the distance apart of these flanges would be a matter which would be carefully provided for and determined with the greatest exactness. Instead of this being the case, it seems very commonly as though it was left to chance. If a railroad company buys a piece of land, in all cases it employs a lawyer who will examine the title and determine its boundary and dimensions with the utmost care, but in buying or building rolling-stock, which is of many fold the value of the real estate, hardly a thought is given to its dimensions, even though these concern its most vital functions. It is hard to understand the general apathy which exists in relation to this subject. Persons who have measured the gauge of the wheels from different roads, have found a most astonishing amount of variation in this respect, and at present it seems impossible to establish a standard which will be generally adopted. There can be no doubt, though, that in the gauge of the wheels the most culpable negligence, carelessness and indifference prevails.

There is no record that we know of which shows the first form adopted for the flanges of wheels, nor of the shapes which they have gradually assumed. Wood's treatise on railroads and Pambour's book on locomotives contain sections of tires, the form of which does not differ materially from those now in use. These were published in 1836 and 1838. The fact seems to be, that the present shape of flanges and also of rails has been assumed to be right without any good or sufficient reason for it, excepting that it worked well in practice. In other words, there are no adequate reasons for inferring that the present form of wheel-flange is the best that is possible. It has been adopted empirically, and there is no sound theory to recommend it. It seems quite within the range of possibility that an elaborate investigation might indicate some important and valuable modifications in the form of these very important parts of all railroad vehicles.

Having, then, pointed out the existing and the possible defects in the construction of railroad car trucks, the question naturally arises, how can they be improved? Before answering this it will be well to inquire whether such improvements are likely to be economical. In the report of experiments on train resistances made by Baron Von Weber, published in the *Railroad Gazette* two weeks ago, he says: "Even vehicles of uniform construction and weight, in consequence of various irregularities and according to their degree of wear, exhibit very different resistances, some being even twice as great as others. Moreover, runs with the same identical vehicles, on the same track and with the same initial speed, never give the same results." Experimenters in this country have observed the same fact, which indicates some cause which produces irregularity of working. Doubtless the more perfect the track and the running-gear of the car, the more nearly uniform would the resistance be. The irregularities noted are a measure of the imperfections of the vehicles, and also of the track. If this is true, the inference would be that if the construction were improved, the resistance of all rolling-stock could be reduced at least to that which has been observed to be the lowest, and possibly even below that. The importance of this may be realized from the fact that the resistance of some cars at moderate speeds is reported to be as high as 8 lbs. per ton on a level and straight line, whereas in others it was as low as 5 lbs. at the same speed. Now, it might be hastily inferred, and some inventors of axles and journal-bearings reason thus, that as this represents a diminution of resistance of three-eighths on a level, that an engine would therefore draw a load in inverse proportion to these resistances, if the lighter draft cars are used. They forgot the influence of gravity on a grade. To show what this is, let us take the resistance of a train at 20 miles an hour and on different grades, given in the table on page 596 of the Catechism of the Locomotive. It will also be assumed that by improved methods of construction the resistance can be reducod 3 lbs. per ton. In the following table the reductions are made, and in the last column the percentages of reduction are calculated.

Grade in feet per mile.	Resistance in lbs. per ton at 20 miles per hour.	Resistance reduced 3 lbs. per ton.	Percentage of reduction.
0	8.3	5.3	36.0
10	12.0	9.0	25.0
20	15.8	12.8	19.0
30	19.6	16.6	15.3
40	23.4	20.4	12.8
50	27.2	24.2	11.0
60	31.0	28.0	9.6
70	34.8	31.8	8.6
80	38.6	35.6	7.7
90	42.3	39.3	7.0
100	46.1	43.1	6.5
150	65.1	62.1	4.6
200	84.0	81.0	3.5
300	121.9	118.9	2.5

From this it will be seen that on a level the resistance would be reduced 36 per cent., whereas, on a grade of 50 feet per mile, the reduction would be only 11 per cent.; on a 100-feet grade, 6.5; on one of 200 feet, 3.5; and on a 300-feet grade only 2.5 per cent. Small as these reductions appear on the steeper grades, yet every railroad manager who has ever given attention to this subject knows how very great the economy is which is due to even a small increase of train load. If the resistance is diminished it becomes possible to increase the size of trains.

If the improvement of car-trucks is proposed, the objection may, of course, be raised that it means additional cost, which may or may not be true. What would seem to be the proper course to pursue would be first to investigate the matter thoroughly, to determine whether it is possible by a more perfect design and construction of trucks to diminish their resistance materially. If this is once established, the problem which would then present itself, would be how to design their parts so as to secure all the advantages sought, and at the same time keep the cost as low as possible, and also to provide special tools and machinery to do the work at the least expense. To do this the highest order of mechanical skill and experience must be enlisted. Unfortunately, a very low estimate seems to be placed on the value of such ability by most railroad managers, and generally it is only when those who possess it can secure a suitable compensation through the patent laws that they will devote themselves to perfecting railroad appliances. There is, however, great room for improvement which is not patentable, and it is here that the lack of the highest order of mechanical knowledge and skill in railroad operation is most apparent.

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A new train on the Great Northern, of England, makes the run from Leeds to London, a distance of 186 miles, in 3 hours and 45 minutes, including three stops. This is about the same as the average speed made by the "Flying Dutchman" on the Great Western.

Tabor's Steam Engine Indicator.

This is a new steam-engine indicator, recently brought out by the Ashcroft Manufacturing Company, of Boston, which indicates two facts of peculiar interest to users of the instrument. First, that it is an improvement on anything of the kind that has gone before, and second, that in its construction, workmanship and material, it will be perfect. We furnish in this connection illustrations of the Tabor Indicator, which, with the description of the instrument and the principle of its action, will give the reader a very correct and complete idea of the advantages it offers. Fig. 1 is a view of the instrument entire, while fig. 2 furnishes a perpendicular sectional view showing the interior arrangements of the parts.

The most striking feature, and, in fact, the main point of novelty in design about this instrument, is the parallel motion. In describing this parallel motion, it can hardly be said that it consists of few or many pieces, as, in fact, no pieces at all are introduced to give the motion parallelism. If that were not desired, the same number of pieces would be required. It will be noticed that the piston rod, which is jointed to the piston and pencil lever as usual, is slotted. This slot is curved and works over a guide roller (fig. 2) set in the cylinder cap. The rear end of the pencil lever is pivoted to the usual radius link. The slot curve is that peculiar curve which would be described by the guide roller as a scribing point while the pencil was being moved to a true line. This, it will be seen, insures an *absolutely correct* parallel motion to the pencil. No moving parts are added, and those essential to the motion are peculiarly light and substantial. The side roller is journaled in a free collar, held in the cylinder cap. This allows all motion work to be freely revolved as the pencil is brought to the paper. By simply unscrewing the cylinder cap the whole motion work is removed as one piece. No small parts of the motion need be removed when springs are changed, or when a general interior inspection is required. This feature seems to be of peculiar value and should be appreciated by those indicator users who have had the misfortune to lose small parts, which were necessarily removed when the indicator was opened. This feature permits the use of substantial and permanent steel screws for all the joints, as they seldom or never require separation. A section of the pencil lever would be a flat oval; it is very light and solid. The pencil socket is arranged to fit Tabor's Siberian leads. The pencil lever, piston rod and radius link are all steel, spring tem-

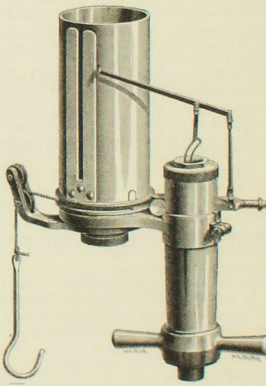

Fig. 1.—Tabor Indicator.

pered. The small number of motion parts, and the lightness of those used, reduce the error due to momentum to a point beyond which it seems unnecessary to go. The friction which might at first be thought to exist at the guide roller, is found *not to exist*. What little friction there is is that due to the conversion of an arcal motion into a parallel one, and this much friction is inherent in any possible device for so converting the motion.

The friction of any of these parts may be called *immaterial* in any of the well-known indicators, as its amount is an inconsiderable trifle compared with the energy of the steam acting on the piston. The momentum of the parts, however, becomes a matter of grave concern, and every effort should be made to keep it at a minimum. The piston spring (40 lbs. per inch) and parallel motion in the Richards Indicator weigh 2.875 ozs. (avoirdupois), and in the Thompson 2.125 ozs., while those of the Tabor instrument weigh 1,427 ozs. The piston, piston rod and pencil lever together weigh only 9.655 drams, or three-fifths of an ounce.

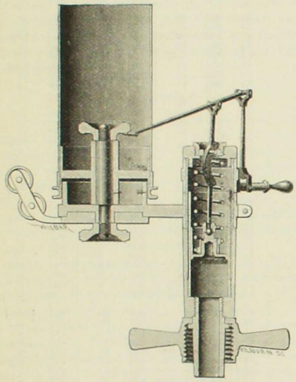

Fig. 2.—Sectional View.

The piston is much longer than usual. It is very light, being made of nickel casting; very much lighter, in fact, than the illustration shows. The piston is brought to the exact area of one-half a square inch, and the lever multiplies the extent of motion in the usual proportion. The piston has a single capillary packing groove, and its whole action is remarkably nice. The springs, both as to range and general structure, are similar to those in the Richards and Thompson.

The rotation of the top work is effected by a handle, as usual, but a controllable limit is put upon this motion by means of a thumb-screw in the top band, bearing against a projection in the drum bracket. This screw is so located that it may be adjusted by the hand while putting the pencil to work.

There is nothing peculiar about the construction of the cylinder, save in its peculiar external plainness. The usual form of cock, not shown in the illustration, is provided, but a change has been made in the plan of attaching the indicator to the cock. The usual compound screw coupling, on account of the difficulty of properly timing the two threads, is omitted, and a simple union nut with finger levers substituted. This nut, never being removed, serves to protect the taper and ground surface of the tail piece, which fits the socket of the cock. Upon loosening this nut it separates the joint without danger of injury to the parts.

The paper drum is made very much lighter than usual, and the paper clips are of tempered steel, and quite flexible. The lower guide pulleys are self-adjusting in their line, as the bottom nut is arranged not to pinch on the swiveling piece, which holds them. The paper drum revolves upon a steel spindle, upon which the bottom nut is screwed. The nut inside the drum is simply a milled head, firmly screwed on the upper end of the spindle.

The recoil spring is seated in a cup on the bracket, and the outer end of the spring is fixed to the cup. The inner end of the spring is hooked on by the hub of the drum base. A stop-block on the cup, engaged with the lug in the drum base, forms the stop for the recoil motion. If the spindle be slacked somewhat, the drum base may be revolved over the stop-block, and more or less tension given to the recoil spring.

The whole instrument is very much lighter and more portable than any others we have seen. Its weight complete with cock attached, is three pounds six ounces. The Thompson Indicator weighs about one pound more than this, and the Richards Indicator about a pound and a half more than this. This reduction of weight, of course, becomes a matter of special value only when circumstances require hand carriage of instruments. The workmanship of the instruments is excellent, and their behavior in use is very fine. We might, perhaps, have done well to present diagrams as produced by this instrument, but we shall have occasion to do so in a future issue.

The diagrams produced are admirable. A seventy-five pound card, taken with a thirty-spring, at two hundred and sixteen revolutions, and retracing its line continuously for fifty revolutions, shows a clean, sharply-cut, unvarying card of the most delicate accuracy.

A seventy pound card, taken with a thirty-two spring, at three hundred and eighty-five revolutions, gives results so perfect as to almost lead to the conclusion that high speed need not interfere with accurate indicator work.

The construction of this instrument seems to open up a way for high pressure diagrams made with low tension springs, even at the highest of modern high speeds. This instrument may be used either right or left handed, the necessary changes requiring only a few moments. The Tabor Indicator is made by the Ashcroft Manufacturing Company, 53 Sudbury street, Boston, Mass., to whom all inquiries should be addressed.

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American Locomotives and Cars.

We extract the following from the annual address read before the convention of the American Society of Civil Engineers at St. Louis, in May last. The address was prepared by Mr. O. Chanute, the vice-president, with the assistance of the members of the Society :

"The early locomotives obtained an adhesion and tractile power equal to $\frac{1}{14}$ of the weight upon their driving wheels. I believe that in other countries $\frac{1}{7}$ of the weight is even now considered a standard and satisfactory performance, while our American locomotives, including the latest type, the "Consolidation" engine, of 50 tons weight, regularly work up to $\frac{1}{5}$ in winter, and $\frac{1}{4.5}$ in summer, of the weight upon their drivers, with occasional performances up to $\frac{1}{3}$, and even less. That is to say, if a locomotive has 88,000 pounds weight upon eight driving wheels, and obtains an adhesion of $\frac{1}{7}$, it will pull a train equal in resistance to the lifting of a weight of 12,571 pounds ; while if it works up to $\frac{1}{4.5}$ in adhesion, it would pull 19,555 pounds, or 55 per cent. more under the same circumstances. Not only do our locomotives pull greater trains than do European locomotives, in proportion to their own weight, but they run more miles in the course of the year : Stürmer's statistics for 1875, showing that the average train mileage for locomotives (not the engine mileage, but the mileage of passenger and freight trains, divided by the whole number of locomotives) was for all Europe, 15,720 miles per year, and for the United States, 21,900 miles per annum. This has been accomplished by a series of improvements in construction, which have brought our locomotives materially to differ from their European prototypes, and which fairly entitle us to speak of them as American in design.

"These improvements chiefly consist : First. In the substitution for a rigidly attached pair of leading wheels, of a four-wheeled truck pivoted at its center, or of a swing-beam pair of wheels under the front end, thus allowing lateral play, and giving the engine great ease in passing curves; and also, Second: In the connecting together of the driving-wheels and axles with one or more pairs of equalizing levers to distribute the weight among them, and thus keep its apportionment nearly constant, while the wheels are free to follow and adapt themselves to all the irregularities and deflections of the track. These two features, together with careful counterbalancing and easy springs, have not only given our locomotives great ease and steadiness of motion even over rough tracks, but have made them more efficient over good tracks. Moreover, outside cylinders, and accessibility of parts give great facility for repairs, and notwithstanding the higher prices which we pay in this country for labor and materials, our American locomotives are cheaper to build and to maintain than those of foreign makers. This efficiency in the motive power has enabled us to cheapen greatly the construction of our roads, by locating them with sharper curves and steeper grades than would otherwise be possible, as is evidenced by the comparison of cost per mile. There are, however, a number of features of European locomotive practice which it would be well for us to study and possible to imitate, such as improved methods of boiler construction, economy in fuel, and a better proportion of heating surfaces.

"We have applied to railroad cars also similar features of flexibility and diminished resistance, by placing under each end a pivoted truck of four wheels instead of a single pair of wheels, rigidly attached. This arrangement enables us not only to shorten the wheel-base, but to lengthen the car. It passes with ease around curves even as short as 100 feet in radius ; and improved design and workmanship, together with our tight journal-boxes, lubricated with mineral oils, have reduced the resistance of cars so much that recent experiments made upon several of our roads, indicate a rolling friction of only four or five pounds per ton *on a level, straight line at low speed*, or only one-half of the coefficient as given in all engineering notebooks.

"Until recently, the proportion of live or paying weight caried by our freight cars, did not as well compare with their own dead weight as in European freight cars. The latter, with four wheels, generally weigh 13,000 pounds and carry 20,000 pounds when fully loaded. It took us a long while to realize that having started with 8 wheels under our cars, we could, by increasing their weight in some degree, at the same time increase their carrying capacity in still greater ratio, and so obtain better proportions. The more recent freight cars, however, those of the Pennsylvania Railroad, carry 40,000 pounds and they weigh about 21,000, or 22,000 pounds, if built as box cars, and 19,000 pounds, if constructed as coal cars, the latter especially, being exceedingly well designed.

"And since I have mentioned the name of the Pensylvania Railroad, allow me to call the attention of the members of this society to the study and imitation of that splendid work, which, if not the most perfect, is certainly one of the most perfect railroads in the world. The expenditure of money and thought and care which has been going on upon it for many years, has reduced the cost of transportation over it to less than obtains on any other trunk line which crosses the Alleghany range.

"There are two features of European practice which perhaps it would be well for us to introduce in our freight cars. The first is the substitution of iron for the wooden sills which now form their foundation. The second is the larger use of platform and gondola cars for carrying freight. Even dry-goods and groceries, covered with tarpaulins, are carried on flat cars in England, where it rains much oftener than it does here ; and the ease and cheapness with which these cars are loaded and unloaded (with proper appliances) in comparison with our box cars, promises a notable economy of station labor. We also continue to handle all goods at our depots with hand labor. At all stations where traffic is larger, we might substitute machinery to advantage for many classes of freight. This offers a fine field of invention and adaptation for engineers or mechanics.

"While paying much attention to cheapness in the transportation of freight, and obtaining results which compare favorably with those obtained elsewhere, we have not been unmindful of the safety of passengers. Our safety platforms and power brakes, together with the extended use of the telegraph, have made traveling in this country generally as safe as it is abroad, notwithstanding the lighter character of our roads, and the fact that most of these are single tracked.

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How Paper Wheels are Made.

The process of preparing the paper for insertion in the wheel is thus described by the *Paper World:* The paper is straw-board of rather fine texture. It is received in the ordinary broad sheets, differing in no particular from those used for straw-board boxes or other similar work. These sheets as they come from the paper mill are square, and must first of all be cut to a circular pattern. This is rapidly done on a large table, with a knife which is guided by a radial arm that swings freely the surface of the table from a pivot at the center. A small disk is also cut from the center of the sheet to allow for the iron hub. Being thus reduced to the required shape and dimensions, the paper must now be converted from a mass of loose sheets into a compact, dense body, capable of withstanding the tremendous crushing force to which it will be subjected in the wheels. This is accomplished in the following manner: Ten sheets are pasted together, one upon another, making a disk about one-eighth of an inch thick. Enough of these disks having been prepared to fill a powerful hydraulic press, they are subjected to a pressure of 1,800 pounds to the square inch. When removed, the disks are hung on poles in a steam-heated loft, and left six days to dry. Thicker disks are then made, each formed by pasting together two or three of those already finished. These are pressed and dried as before, and the process is repeated until a block is built four inches thick, and of about the specific gravity of lignum vitæ. After each pasting and pressing six days are allowed for drying, and when the block is complete it is left in a drying room until thoroughly seasoned. The next operation is that of turning the paper blocks to fit the steel tires and iron hubs. This is done in lathes with as much accuracy and in exactly the same manner as if the material worked on was iron or wood. The circumference is turned to a perfect circle of the precise diameter required, a bed or recess is worked out for the web of the tire to rest in, and the surfaces are left hard and smooth and the edges sharply defined. The block is then painted and is ready for its place in the wheel.

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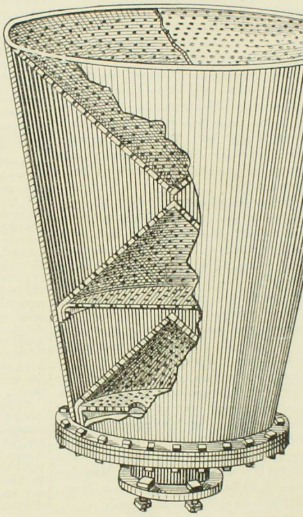
A New Station Indicator.

Mr. Charles Minton, of Woodside, N. J., has invented an improved station indicator for railroad cars. The face of this indicator is about a foot square and presents a level surface. Its upper half is stationary and has in large letters "The Next Station is," the lower half on which the stations are shown being moveable. Some notion of the machine may be gained from the statement that it is similar in construction to the date-box, which is familiar to most persons, by which the month is given on the upper part of its face, and the day of the month below, the day of the month being changed as required by rollers which work a moveable apron on which the figures are printed. By the addition of mechanism, however, the station indicator is operated instantly by simply touching a button, and this can be done from either inside or outside the car. The machine is intended to be placed in the car on the right-hand side of the door facing the passengers; and when a train leaves a station the conductor or brakeman touches a button. This causes a bell to ring immediately, attracting attention to the indicator, which shows in large legible letters, "The next station is New Haven"—or elsewhere, as the case may require.

The indicator is capable of showing the stations on two or more lines, so as to be available in case a railroad company should shift their cars from one line to another, and it can also be operated automatically if desired. For instance on the elevated railroads, shutting the gates on the platform—an operation that as a rule must be performed at all stations—might be made to operate the indicator; but as the conductor must be there to shut the gate, and he would have when there simply to raise his hand in order to touch the button, it might possibly ensure care and watchfulness to work it by hand. The operator, it is said, can immediately detect any error in the working of the indicator whether he be inside or outside.



THE BUZZELL STEAM SILENCER.

The device shown in the engraving is designed to be attached to exhaust steam passages for the purpose of preventing or silencing the noise of escaping steam. It consists of a shell or case, within which are a series of gradually enlarging chambers, separated by perforated diaphragms, which allow the steam as it is admitted into the respective chambers to expand more and more until it emerges at the top, when it makes little or no noise, its velocity being checked and modified in its progress through the several compartments. The inlet at the bottom is usually about five inches in diameter, and is connected with the exhaust pipe or steam chamber by either one or two inlet pipes, as may be desired. The broken-away part of the drawing shows the form and position of the plates and diaphragms with their perforations. The combined area of the perforations in each being equal to or in excess of the area of the inlet, so that while the volume of escaping steam is not obstructed, it is so broken up and checked as to greatly diminish the noise when it reaches the open air. The device is applicable to all exhaust pipes, and especially to steam brakes, as well as to apparatus worked by compressed air. Inquiries in regard to it may be addressed to the Buzzell Steam Silencer Co., 163 Albany street, Boston, Mass.

Tests of Brake-Shoes.

The following statement of experimental tests of cast-iron, wrought-iron and Congdon brake-shoes was read at the meeting of the Car-Builders' Association, at Detroit, by Mr. C. E. Garey, of the New York & Harlem Railroad. The tests were not made on a running train, but with a pair of wheels fitted upon a standard axle and run by a pulley and shaft, the shoes and wheels being new and none of them a perfect fit:

Trials.	Miles per hour....	Cast-iron.		Congdon.		Wrought-iron.	
		Weight on shoe, lbs.	Time in stopping, seconds.	Weight on shoe, lbs.	Time in stopping, seconds..	Weight on shoe, lbs.	Time in stopping, seconds..
1......	45	200	322	200	322	200	74
2......	45	392	32	392	47	200	61
3......	45	392	30	392	37	392	20
4......	45	392	30	392	36½	392	20
5......	45	....	......	392	39	392	20
1......	35	200	59	200	148	200	28
2......	35	200	53	200	91	200	34
3......	35	200	60	200	70	200	27
4......	35	392	16	200	64	392	14
5......	35	392	15½	200	65	392	12
6......	35	392	16	392	17	392	11½
7......	35	392	15	392	16	392	11
8......	35	392	15	392	16½	392	11
1......	25	392	44	392	21	392	14
2......	25	392	43½	392	20	392	12
3......	25	392	38½	392	20	392	12
4......	25	392	35	392	19	392	12
5......	25	392	30	392	19½	392	11½
6......	25	392	33	392	19	392	11½
7......	25	392	45	392	16	392	11½*
8......	25	392	40	392	15½	392	11
9......	25	392	30	392	15	392	10
10......	25	392	44	392	15	392	10½
1......	12	500	34	500	9	500	10†
2......	12	500	20	500	7½	500	8½
3......	12	500	20½	500	5	500	7½
4......	12	500	19	500	5½	500	7
5......	12	500	16	500	4	500	6
6......	12	500	11	500	6½	500	7*
7......	12	500	10	500	5	500	6½
8......	12	500	10	500	6½	500	6
9......	12	500	10½	500	9	500	6
10......	12	500	9½	500	7½	500	6
1......	12	425	....	425	40	425	10
2......	12			425	20	425	8½
3......	12	(Cast-iron shoe		425	18	425	8
4......	12	failed to stop		425	18	425	8½
5......	12	wheel or lessen		425	17	425	8
6......	12	speed in		425	43	425	9½*
7......	12	running sev-		425	15	425	7
8......	12	eral minutes.)		425	15	425	5
9......	12			425	13½	425	4
10......	12			425	12½	425	7
	12	Ten stops.		425	212	425	75½

* Wet wheels.
† Dry wheels.

Size of cast-iron shoe, 3½ × 13 in.; wearing surface, 45½ sq. in.

Size of Congdon shoe, 3½ × 13 in.; wearing surface, 45½ sq. in.

Size of wrought-iron shoe, 3 × 12 in.; wearing surface 36 sq. in.

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The Chicago, Milwaukee & St. Paul Railway Company has ordered a large number of new freight cars. The final installment is to be delivered by the last of September.

The Peninsular Car Works, of Detroit, are building 100 flat cars, 33 ft. long, for the Indianapolis, Peru & Chicago road. They are intended for the lumber trade.

The Wabash, St. Louis & Pacific has ordered two new chair cars, five hundred grain cars, and seven new locomotives.

The Union Pacific shops at Omaha are changing a number of old passenger cars into emigrant sleeping cars, similar to those in use on the Central Pacific.

The Ohio Falls Car Works, at Jeffersonville, Ind. are shipping a large lot of freight cars to the Minneapolis & St. Louis road.

A new style of excursion car recently made at Cleveland, Ohio, and now running on the C., C., C. & I. road, is thus described: In the front part of the car is a lunch room, where sandwiches, strawberries, ice-cream, and all other edibles of the season, can be obtained. A dining-hall is arranged in the middle of the car, and tables sufficient to accommodate forty persons, four at a table, are built on either side. The tables are made of ash timber, and also the seats, with bamboo bottoms. In the rear part of the car are the pantry and kitchen. The latter is supplied with a range, and shut off from the pantry by means of a sliding door. The car is provided with two refrigerators and ice-chests for meats and vegetables.

Mr. F. A. Nash, the car accountant of the Union Pacific road, has invented and copyrighted a plan of keeping track of the 6,000 freight cars on the various lines of that company. The system is worked by means of telegraphic reports. After a car has remained two days at a station, Mr. Nash telegraphs to the agent to learn what is being done with the car, etc., and in this way the cars are kept moving. The numbers of the cars are telegraphed to Mr. Nash upon their arrival at stations. A complete record is also kept of the cars of other roads from the day they are received until they are returned, the charge per mile being ¾ of a cent for the transportation of the cars of other roads. During the year 1879 foreign cars made a mileage of 68,441,149 over the Union Pacific, 78 per cent. of the cars being loaded, 22 per cent. being empty.

◆

The Wardwell Patent Saw Benches.

The cuts illustrate the standard machines well known by the above name, and which have been extensively introduced throughout the country for a great variety of wood work. They are adapted to all kinds of pattern, cabinet and builders' shops where accuracy of sawing is indispensable, the special claim of the machine being such excellence of work that other tools for correcting the finished product are rarely if ever necessary.

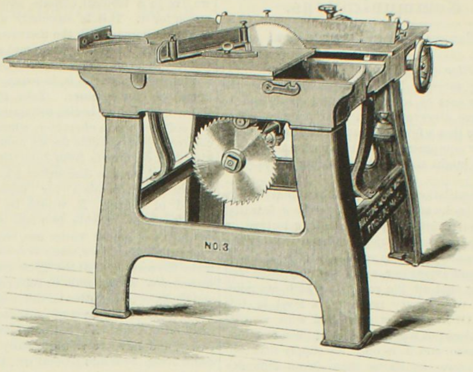

Fig. 1.--NO. 3 SAW BENCH.

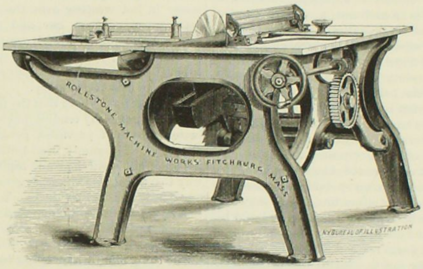
ROLLSTONE MACHINE WORKS FITCHBURG MASS.

Fig. 2.--NO. 4 SAW BENCH.

By an inspection of the engravings, it will be seen that the machine carries two saws, each upon a separate arbor, which arbors are supported in a frame which rotates about a central axis, an arrangement which permits one saw to be at once exchanged for the other, and firmly held in any desired position for splitting, tonguing, grooving, halving, rabbeting, etc. All of these operations, it is claimed, can be so nicely executed that planes and other tools for finishing are rarely necessary. The left-hand side of the table slides on tracks and carries a rest which permits it to be set for accurately sawing an octagon, hexagon, square or miter, by means of pins and corresponding holes in the table; and quite as readily adjusted for accurately sawing to any desired angle by means of a graduated arc divided and marked into degrees, over which the cutting-off fence swings and is fastened at pleasure. The splitting fence, carried on the right-hand part of the table and sweeping its full width, can also be adjusted to split any angle from a square to a miter.

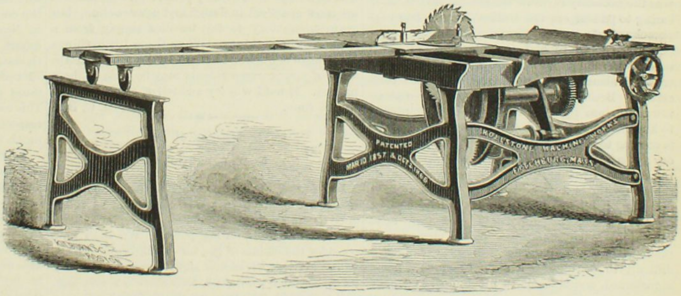

Fig. 3.--NO. 5 SAW BENCH.

A series of light cutting-off gauges are furnished with the machine, when desired, which may be used on one or both sides of the saw for such work as picture-frames, etc., they are also constructed to be used with plowing and dadoing heads, which may be readily adjust to cut various depths.

One of the best attachments of the machine is that for sawing out circular forms for work like core-boxes, lagging, etc., by which the hollow part of a core-box, for example, can be so nicely sawed that a little sanding with a sand roll is all that is required to finish it. The position of the saw, it may be added, is regulated by using the hand-wheel seen on the front of the frame.

These machines are constructed of several sizes, provided with steel arbors, ground bearings, wide belt pulleys, etc. The engravings show three sizes of the machine, the important details of which are herewith given.

Fig. 1 is the saw bench No. 3, table 36 inches square, carries two 12-inch saws, with sliding table 16 inches wide. This is a very desirable machine for pattern, cabinet and light work generally where accuracy in sawing is desirable. It miters, bevels, grooves, and performs all the operations necessary to the above-named shops. Driving pulleys 6½ inches face; weight, 950 pounds.

No. 4 (Fig. 2) is heavier than No. 3, has a table 4 feet square, and carries two 14-inch or one 20-inch saw. It is for carpenter and other shops where a No. 3 would be too small. It has the angular, splitting grooving and dadoing appliances same as No. 3. Driving pulleys 3½ inches diameter, 7-inch face; weight, 1,100 lbs.

No. 5 (Fig. 3) is for shops where very heavy work is required. Table 51 inches square; carries two saws from 12 to 16 inches in diameter, or a single saw of any size up to 26 inches. Driving pulleys 4 inches in diameter, 8 inches face; weight 1,500 pounds. It has the angular and splitting rests, and grooving and dadoing appliances, same as No. 3; and, when wanted, an extension table, as shown in the cut.

These machines are manufactured by the Rollstone Machine Co., Water street, Fitchburg, Mass.

Communications.

Summer Notes on Passenger Cars.

To the Editor of the National Car-Builder:

Having recently had opportunity to see the passenger cars of several different roads and to make some observations on their practice, it has struck me that a few notes on points wherein the passenger equipment of our American roads is deficient, might not be without interest to your readers.

As to ventilation, every one knows that we are still very backward. Now, you need not fear that I am about to inflict upon you a long lecture on this much-discussed subject. I know too well the difficulties attending the ventilation of a passenger car from sad experience, and I was only interested in finding that all the roads to which my notes extended were pretty much on a level in this respect. Of heating, as connected with ventilation, one does not want to speak, or even to think, at this season, and it is only air supply that concerns us now. Of course there is no difficulty about getting air enough in a car in hot weather, when every one wants the windows open; the trouble is that our air is so heavily laden with dust, that it is sometimes a choice of two evils, whether we shall swelter in airless heat, or our exterior persons and interior breathing apparatus shall be so clogged with dust as to make life a burden, and traveling something to be shunned. It is said that stone ballast prevents much of this; but all roads cannot be stone-ballasted; and, at any rate, car-builders have nothing to do with that, but must take the roads as they are and try and make the best of their circumstances. It does really seem as if our boasted American ingenuity was at fault when we keep on building passenger cars in which we must either breathe air which is half dust, or else barely breath at all. As I said before, I have found all roads about on a level in this matter, and I was really a little relieved when I realized that the line in which I was particularly interested was not alone in its shortcomings.

Another thing that impressed itself on my mind was the necessity of some simple method of indicating to passengers the stations as the train approaches them. At this season especially, many people are going to and fro who are not much used to traveling, and who are a little nervous and troubled about knowing when they reach their station. Besides, to one who is traveling for pleasure and to see the country, it is often of interest to know where he is and what town or village he is coming to. Now I am not willing to join in the cry against the carelessness of brakemen in this respect. A great many, I really believe, try to do their duty the best they know how, but all have not the habit of pronouncing names clearly, and it is often impossible for the most careful to make themselves plainly heard over the noise of the train. The ordinary ear finds it difficult to distinguish a name to which it is not accustomed, and it seems to me foolish to depend as we do upon a mere verbal announcement. There have been several devices invented for indicating station names to passengers. I am sorry to say that I have never examined any of them and know nothing of their merits, but it is surely not a difficult problem. We can all readily see how a simple and inexpensive arrangement can be made for this purpose, and if we traveled more than many of us do, I think we would realize its usefulness. It may seem a small matter, but I believe it is one of those minor things which travelers generally would fully appreciate.

But perhaps the most notable thing on nearly all our roads is the way in which we fail to provide for summer. It is an old and trite saying that for several months of the year, in our Middle States, we live in a tropical climate and make no provision for it. This is especially apparent in our passenger cars. With the thermometer up among the nineties we vainly try to make ourselves comfortable in a car which is admirably designed for winter use, but which is, in many respects, quite unsuitable for summer. Take the seats, for instance: Their high backs, soft cushions, and generally soft and warm character, which make them as comfortable as possible for six months in the year, give their occupants from June till September an amount of positive discomfort which often makes a journey undertaken for pleasure almost a period of torture. It would be impossible on most roads to provide two sets of cars, one for summer and one for winter use, but it surely is not a very difficult matter, nor a very expensive one, to make the seats so that the thick cushions and the warm, close backs could be replaced by light seats and backs of cane, rattan or other similar material. These seats have been used on those roads near our great cities whose chief business is summer pleasure travel, and have been universally liked. If we could bring them into general use, I am sure a new generation of travelers would rise up and call us blessed. Anyone can appreciate the advantages which a light, open and yet comfortable seat possesses in hot weather over the cushion with its usual warm crimson hue, and its suggestions of dirt and discomfort. This is a matter about which, it seems to me, we would all do well to think, and to act if we can—and to urge our superior officers to act, where that is necessary.

I am glad to say here that the fashion in decorating cars is generally tending toward a quieter and better taste than prevailed generally some years years ago. The gaudy head-linings and the profusion of gilt mouldings and high colors are giving way to natural woods and a generally more subdued style and better taste. I have seen some Pennsylvania cars which seemed to me decorated in almost perfect taste, and some other roads are not far behind.

One thing more which ought to be spoken of at length, were it not that this letter is already almost too long for the patience of your readers. And that is, that there are many roads on which the cars are most excellent in design and construction, but are unsatisfactory to the traveler simply from a neglect of little things. What these little things are, I have not space to enumerate here. Perhaps some of your correspondents may be able to help me out. If not I will try and tell of them at some future time.

M. C. B.

* * *

The Lighting of Cars.

BY W. E. PARTRIDGE.

In a former article upon this subject, the utility of oils for lighting cars was considered in reference to the essential requisites of economy, convenience and illuminating power. We shall now consider the claims of gas for car lighting, the advantages of which at first sight appears to be very great; so much so, indeed, that there is a very general feeling in its favor among railroad men and the general public. The leading qualities claimed for it are its cleanness, brilliancy, safety, cheapness and convenience. Some of these advantages will readily be conceded, especially its convenience and cleanliness, which are two good points in its favor. There is no oil to be spilled upon seats and carpets, and no oil founts to be carried in and out of the cars and frequently replenished. The other qualities, however, can only be admitted with more or less qualification. Its brilliancy, as it is now used in cars, is not quite all that could be desired. The number of burners is too limited, and while each gives out a wide handsome flame, a close observation reveals the fact that a goodly portion of the flame has a blueish tinge, which makes the size not a true measure of its lighting power. Argand burners would of course be an improvement upon the common fish-tail burners that are used, but if the number of them is no greater than is usually found in passenger cars, the candle-power of the light would hardly come up to the standard required for a well lighted car.

In estimating the cost of lighting a car with gas as it should be lighted, it will be necessary to double the quantity of gas consumed now upon cars, in order to arrive at figures that will be of any value in the matter of cost. The cars of the Pennsylvania Railroad have for some years been lighted with compressed coal gas taken from city mains, and although the light is comparatively good, it is not as good as it should be. As a rule, it is inferior to the best lighted cars of the Metropolitan Elevated road, in each of which six dual burners are used, giving a light of about 90 candle-power, according to Prof. Chandler's experiments with similar burners in 1870. The unsteadiness also of the gas flame, in connection with the kind of shades generally used, has the effect of lessening the quantity of light.

As regards the greater convenience of gas, something more must be taken into account than the getting rid of oil, and that the light is produced by turning a cock and striking a match. If Argand burners are used, the chimneys will need cleaning as often for gas as for oil; and this, with the breakage of globes and chimneys, will fairly offset much of the handling and cleaning of lamps. Gas also necessitates the construction of tanks and other means for storage and distribution, and a force must be employed to do the work. All things considered, gas is much the more easily managed after the necessary apparatus is complete, but it involves a considerable outlay of capital, the interest upon which must not be overlooked in a comparative estimate of cost as between gas and oil.

It must also be borne in mind that gas in this country is usually accounted a luxury, except in a great coal center like Pittsburg, where we believe it may be had for $1.00 per 1,000 feet. Until it may be had every where at some such price as this, it must be regarded as an article outside the limits of strict economy. In order to test the comparative cost of lighting with gas and oil in New York, we lighted three rooms for one month with gas, when the price was $1.75 per thousand. At the end of the month the bill was 75 cents, a sum which would have lighted the same rooms with oil for two months or more. This experiment would seem to be conclusive with respect to the lighting of cars, showing that oil is much the cheapest.

As regards safety, it is generally conceded by railroad men and others, that but little or no danger attends the use of gas upon cars. Under ordinary conditions it is very true that gas is much safer than some of the oils; but that it is perfectly safe upon railway cars is a statement that must be taken with some grains of allowance. In case of a wreck, the pipes would be pretty sure to be broken, and perhaps the main receiver perforated. This would not necessarily cause an explosion, although it is well known that explosions do sometimes occur when gas is thus liberated and mixed with the surrounding air. If it is ignited at once, and before combining with the common air, it will burn fiercely, and cause a fire as difficult to manage as would be an oil fire, but there would be no explosion. Gas becomes explosive like gunpowder, only when it is combined in certain proportions with the outward air. If ignited under these conditions it burns instantaneously through its entire mass, which being mixed with the common air, the resulting gases are heated to a high temperature at the same instant, and expand with the same force that common air would if heated to the same degree. Any combustible substance can be made explosive if prepared so as to burn suddenly like gas. Flour and charcoal may be cited as examples. In the lighting of cars with gas, however, this is a contingency that would very rarely occur, as coal gas is so much lighter than the surrounding atmosphere, it would rise rapidly if there was nothing to obstruct it. Compressed gas has been in use for several years on some of the German railways, and experiments have shown that, if fired at once when liberated from the receivers, it will burn fiercely, but will not explode.

In supplying a car with gas that will produce a light of 120 candle-power in the most economical way, it would be best to use large burners and low pressures. These give the greatest amount of light from a given quantity of gas. A car, to be well lighted, should have 8 burners, each consuming say six feet of gas per hour. These would give a fraction more of light than 120 candles, as each burner would, with the most economical pressure, be equal to about 15½ candles. The consumption, in round numbers, would be about 50 cubic feet per hour, or, making allowance for all contingencies, say 400 feet for six hours.

What we have said in reference to gas is based upon the quality and present cost of the ordinary coal gas used in our cities. In view of its cost, it would perhaps be assuming too much to say that it will ever supersede the oils and become the car light of the future. It is more than likely, however, that cheaper and better gas for lighting may yet be discovered, in which case its superior advantages would cause it to take the place of all other methods.

Wood Preservation.

To Engineers, Architects, Preservers of Wood, Chemists and others :

The undersigned, a Committee of the American Society of Civil Engineers, appointed to report upon the Preservation of Timber, earnestly solicit information concerning past experience in the impregnation and preservation of that material.

Particulars of failures in this country, and if possible the reason therefor, are especially desired. Also information on the following points, in each of the processes which may have been used:

1. Kind of timber operated on—green or dry—age, dimensions, etc.
2. Preserving ingredients injected.
3. Quantity injected per cubic foot or tie.
4. Mode of application, process, time employed, degree of heat, pressure, vacuum, etc.
5. Subsequent use and exposure of timber (bridges, buildings or track).
6. Result of preparation and comparison with life of unprepared timber.

This special and any general information on the subject is respectfully solicited.

Replies can be mailed to the Chairman of the Committee.

B. M. HARROD,
Chairman, 122 Common street, New Orleans, La.
G. BOUSCAREN,
82 West Third street, Cincinnati, O.
E. R. ANDREWS,
10 Warren street, New York, N. Y.
E. W. BOWDITCH,
60 Devonshire street, Boston, Mass.
Col. GEO. H. MENDELL,
U. S. Engineer, San Francisco, Cal.
J. W. PUTNAM,
P. O. Box 2,734, New Orleans, La.
Committee.

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THE Hecla cast-steel railway wheel, manufactured by the Hadfield Steel Foundry Co., Sheffield, England, is claimed to be a form of wheel complete in itself and inseparable. The actual use of all the steel in the wheel-tread is obtained, and the tire may be worn down nearly to the spokes without danger of the tire getting loose, stretching or bursting. There are also no tire fastenings, nor any strain on tire, arms or boss, the contraction being equal all round. It is said to be free from the defects of built-up wheels, posesses greater elasticity, and resists the sudden application of the brakes better than ordinary wheels.

Miscellaneous Items.

THE firm of Bowler, Maher & Brayton, the well-known car-wheel manufacturers of Cleveland, Ohio, has been reorganized under the name of Bowler & Company. They are full of orders for wheels, machinery castings, frogs, etc.

THE Barney & Smith Manufacturing Company, of Dayton, O., have orders for four additional first-class passenger coaches for the Atchison, Topeka & Santa Fe Railroad Company. They are to have under them the 42-inch Allen paper wheel, of the pattern adopted as the standard of this first-class road.

THE Lehigh Valley shops, at Hazleton, Pa., have just turned out a heavy passenger engine for use on the grades over the mountain. It has 20x24 in. cylinders, and 4 driving wheels 68 in. in diameter. It is expected to take the heaviest passenger trains over the mountain grades without a helper. The shops of the same road at Easton, are to be enlarged by a new foundry and car-shop.

The Flint & Pere Marquette shops, Saginaw, Mich., are building two new baggage cars and six caboose cars, and will soon begin work on 100 long flat cars for carrying logs.

THE Schenectady (N. Y.) Locomotive Works have orders ahead for over 50 engines. A new shop 60 × 170 ft. is being built for the steam hammers and heavier blacksmith work.

THE Laconia Car Company, at Laconia, N. H., is building several excursion cars for the Nastasket Beach road, near Boston.

THE works of A. Whitney & Sons, in Philadelphia, are running full time, with heavy orders for car wheels.

THE Westinghouse Air Brake Co., in Pittsburg, has an order for automatic brakes for the passenger equipment of the New York Central & Hudson River road; also for automatic brakes for eight engines and seventy-five cars for the Boston & Albany road.

THE Gilbert & Bush Co., at Troy, N. Y., has just completed ten passenger cars for the Flint & Pere Marquette, and two for the Detroit, Lansing & Northern road.

WELLS, FRENCH & Co., of Chicago, have just delivered 300 stock cars to the Chicago, Burlington & Quincy, and are building 100 grain cars for the same road.

THE Nashville, Chattanooga & St. Louis shops, in Nashville, Tenn., are building a new wrecking car and a number of flat cars for the road.

THE Lehigh Valley shops, at Easton, Pa., are building a pay car for the road, which is to be very handsomely fitted up.

THE Barney & Smith Manufacturing Co., at Dayton, O., are building 200 grain cars for the Chicago, Burlington & Quincy road.

THE Philadelphia, Wilmington & Baltimore shops, in Wilmington, Del., are building a number of light cars to be used on the suburban trains out of Philadelphia.

THE Wythe Speed Recorder Co., at Kent, O., has orders for 60 of its speed recorders for the New York, Lake Erie & Western road.

THE Westinghouse Air-Brake Company has a patent for manufacturing-gas by passing compressed air through a vessel containing sponges saturated with gasoline. It gives a brilliant, pure white light, making common gas-light look yellow and gloomy in comparison; at the same time it does not blind a person as the electric light does. The gas can be furnished at 60 cents per 1,000 cubic feet.

THE Manhattan Elevated road has received the last of 25 locomotives ordered last November of the Providence Company. They are the largest engines yet placed on the structure, and weigh, in working order, 14,750 lbs.; cylinders 11x16; four drivers, 39 in. diameter, and 28-inch wheels.

THE Harlan & Hollingsworth Co., Wilmington, Del., have just completed two Woodruff parlor and sleeping cars to run on the Wisconsin Central Railroad. They are beautifully finished in walnnt and mahogany, and have decorated wood ceilings. Like other cars of the Woodruff pattern, the berth fixtures and bedding are stowed away under the seats in the day-time, leaving the upper part of the car unencumbered, and causing a steadier motion by having this portion of the weight on a line with the floor. The cost of the cars is said to be about $11,000 each. The company now have 64 of this class of cars running on Eastern and Western roads, the Camden & Atlantic and Manhattan Beach roads being prominent among the former.

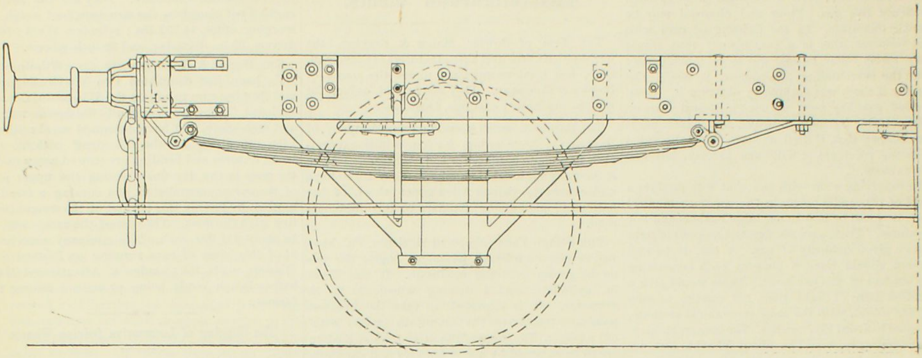
The Slipping of Locomotive Driving-Wheels.

A recent number of *Engineering* (London) contains a statement of some experiments made on the Northern Railway of France to determine the extent of slipping by locomotive driving-wheels at speeds varying from 43 to 74 miles per hour. The first experiments were made with a four-coupled engine, having coupled-wheels 7 feet in diameter, and carrying a total load of 27 tons. It was found that this engine, when running light and in fine weather, at the high speed of 74½ miles an hour down a gradient of 1 in 200, apparently slipped continuously to the extent of 19 per cent., while other engines also gave results of a similar kind, the slipping at maximum speeds apparently varying from 13 to 25 per cent. Other and more recent experiments, however, show a different result at speeds varying from 43 to 56 miles per hour. For this purpose six locomotives of three different types were used, five of them having four-coupled wheels, while the sixth was a Crampton engine, with a single pair of drivers. The circumference of the wheels was obtained by measuring the rails traversed by one revolution. The results showed that under the conditions of the trials no slipping whatever occurred, and that any doubts in regard to the partial slipping of driving-wheels under the ordinary conditions of locomotive working, may be set at rest, and that this supposed action need not be taken into account as a cause of wear and tear.

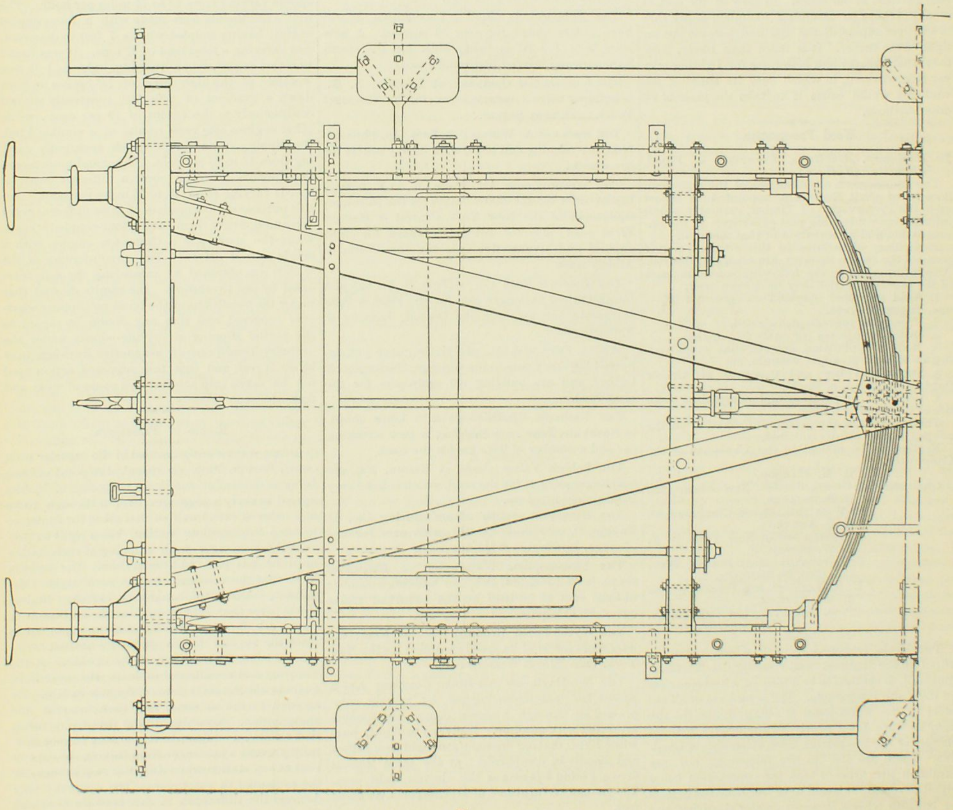
Rights of Passengers.

A case was recently decided in the superior civil court, Boston, Mass., on appeal, the point at issue being to determine whether a corporation, having agreed to carry a passenger over a through route at a reduced rate, less than that asked for transport to some intermediate station, has a right to prevent the passenger from stopping at such station until he has paid additional fare. The decision holds that the company has no such right. McAllister, the plaintiff, bought an ordinary limited ticket over the Old Colony line, from Boston to New York, for $1. Arriving at Newport, to which place the regular fare is $1.60, he started to go ashore, when he was stopped by an officer of the company and not allowed to leave the boat until he had paid the sixty cents difference in fare. He acceded to the demand, and then brought the above action. According to the decision, it seems that a railroad or steamboat company cannot lawfully prevent a passenger from leaving the cars or boat at any station when a regular stop is made for the exchange of passengers. The company may demand the difference in fare between local and the through rate, and if payment is refused, recover the same in a civil action, but have no other remedy.

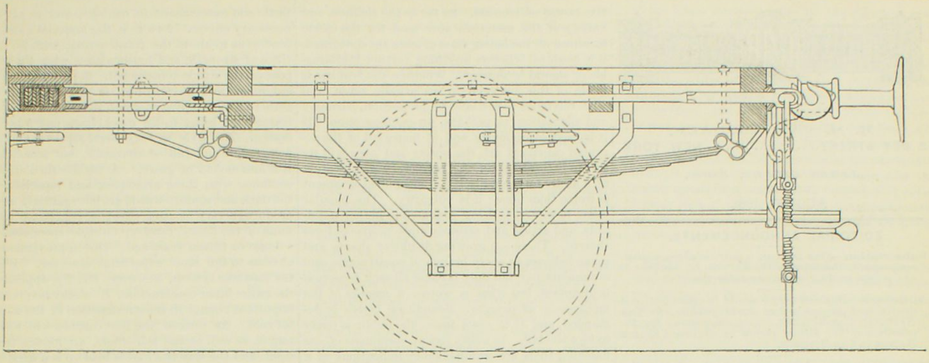
FIRST-CLASS CARRIAGE—WESTERN RAILWAY OF FRANCE.



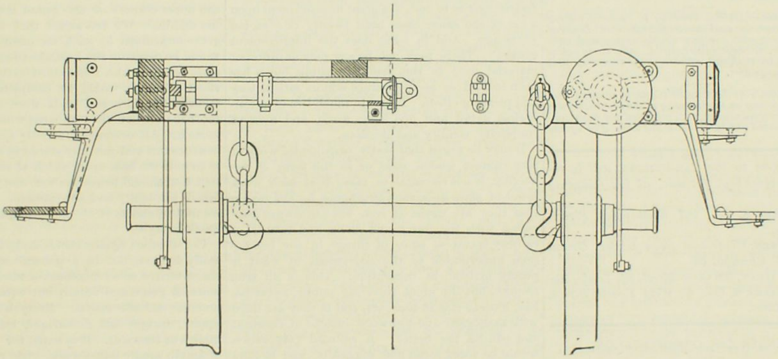
Elevation.



Plan.



Section.



End Elevation and Section.

THE engravings, which we reproduce from the London *Engineer*, represent the under-framing of a first-class carriage of the Western Railway of France. The principal dimensions are as follows:

	ft.	in.
Length over buffers	23	7.46
Length of frame	20	0.16
Width of frame	8	7.55
Height of body	6	1.5
Wheel base	12	3.66
Width over steps	10	2.05
Center to center of journals	6	3.62
Center of buffer above rail	3	4.15
Diameter of wheels	3	4.5
End and side sills	3.94 x	9.85 in.

The carriage is divided into three compartments, each seating eight passengers, or 24 in all. The elliptic spring shown in the half plan acts both as a buffer and draw spring, the draft strain being from the central part of the framing at the junction of the diagonal braces. Many of the carriages on this road are longer than this, but none, we believe, exceed 30 feet. The construction is in many cases of a composite type, in which channel iron is used for the longitudinal pieces and wood for the end sills. The roof and floor are made double, the interspaces in both cases being packed with dried sea-weed. The upholstery and other fittings of the interior of the carriage is of the best description.

Car-Coupling and its Dangers.

General manager Ledyard, of the Michigan Central road, is reported as expressing the following views on this subject:

"I really see no solution to the problem. I have studied a great deal, inventors have cudgeled their brains on this subject for thirty years, and yet no practical improvement on the present link and pin for freight cars has been produced. Hundreds of devices for coupling cars by a handle on the side, which obviated the necessity of the brakemen going between cars, have been invented, but they are all liable to get out of order, and are also very expensive. Recently the Lake Shore gave its switchmen an iron 'stick,' and told them to use it in coupling, and not go between the cars, but the men would not use it. The reason of their disobedience was a foolish pride. They all thought they were smart enough to couple cars without getting hurt, and they thought it looked awkward and cowardly to do the work with a stick. The Pennsylvania, Erie, and all the coal roads, place two dead-woods, one on each side of the drawhead. The idea which underlies their use is that the ordinary iron coupler is not a good protection to the brakeman, because the heavy spring at the end, which is under the car, is apt to give way, and then the two cars come together and crush the brakeman to death. By the use of the dead-woods, it is claimed, the brakeman can only lose his arm. There are now two suits against railroads, based on these two opposing theories of car construction. One is brought against the Michigan Central by a brakeman in its employ, who lost his arm between the dead-woods of Erie cars passing over the road, on the ground that dead-woods are improper and dangerous. The other is brought against the Lackawanna road by one of the brakemen, who sues for injuries sustained from the ordinary coupler, for the same reason, and who also alleges that if dead-woods were used he would not have been injured."

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THE report of the General Manager of the Pennsylvania Railroad says that the entire number of locomotives in daily use on the main line and on the Philadelphia & Erie and united railroads of New Jersey divisions is 1,004, while the passenger traffic equipment shows a total of 925 cars, including 587 first-class coaches; the freight equipment, 18,311 cars, and the maintenance of way equipment, 2,100 cars, showing a grand total of 21,336 freight cars, passenger coaches and locomotives. In addition to this equipment, there were also 18,730 cars running over the various lines owned by individuals and companies.

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EDUCATE your boy to be a railroad brakeman. There are seven Senators who started life in that line of business.

NATIONAL CAR BUILDER

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EDITORIAL ANNOUNCEMENTS.

Subscription.—ONE DOLLAR *a year in advance, postage prepaid. One copy will be sent free for one year to any person sending us five new subscribers.*

Addresses.—*Business letters should be addressed, and drafts and money orders made payable, to* THE NATIONAL CAR-BUILDER. *Communications for the attention of the Editor should be addressed* EDITOR NATIONAL CAR-BUILDER.

Advertisements.—*Nothing will be inserted in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *The editorial department will contain our own views and opinions; and the rest of the reading matter, aside from advertisements, will be such as we consider of interest to our readers.*

Contributions.—*Articles relating to railway rolling stock construction and management, and kindred topics, by those who are practically acquainted with these subjects, are especially desired. Also early notice of changes in railroad officers, organizations and names of companies.*

Special Notice.—*As the* CAR-BUILDER *is printed and ready for mailing on the last day of the month, advertisements, correspondence, etc., intended for insertion, must be received not later than the 25th day of the month.*

SUBSCRIPTIONS *to the* CAR-BUILDER *will be received, and copies kept for sale, at the following places:*

A. WILLIAMS & CO., 283 *Washington Street, Boston, Mass.*

L. SCHAFFNER, *Cigar and News Dealer, Grand Pacific Hotel, Chicago, Ill.*

WILLIE H. GRAY, 306 *Olive Street, St. Louis, Mo.*

ROBERT CLARKE & CO., 65 *West Fourth Street, Cincinnati, Ohio.*

PASSENGER CAR ORNAMENTATION.

The ornamental finish of passenger cars is, like the railroad system itself, a thing of comparatively recent origin. There are no traditional styles, as in furniture and house decoration, that are recognized as guiding principles to be studied, modified and improved upon. Railway cars are vehicles that have little or no similitude in their construction and uses with anything in the past, and consequently their development has been hampered by no conventional drawbacks. The first ones that were built were very plain. They were things of mere utility, made to subserve the uses for which they were designed, with scarcely any ideas of embellishment associated with them. If their occupants were provided with comfortable seats, and could look out upon the country as they moved along, they thought little of varnish, gilding, carving and paint. But, as with many other things belonging to every-day life, we are not content with mere utility, but must have embellishment along with it. So it is with cars. Something must be superadded to please the eye. These adornments were crude enough at first, and for some time afterward, consisting in the main of fanciful vagaries and toy-work, but being either positively bad or indifferently good, were soon disregarded, or looked upon even by the vulgar eye, with aversion.

Little by little this primitive stage has given place to something more rich, sumptuous and costly, but still lacking much of the real decorative power of true art. So far as the richness and variety of the materials now used for the inside finishing of the better class of cars are concerned, it is doubtful whether anything further is attainable or should be desired. Whether the best use is made of this material in an artistic sense, and with reference to the laws of proportion, harmony and adaptation, is, perhaps, an open question. If it is used capriciously and in disregard of the accepted canons of art, the outlay and labor will result in little else than the temporary gratification of a desire for mere display. Misapplied ornament is worse than none; it is vulgarity. The popular taste, however, is being educated to higher standards, and artists and artisans must needs conform thereto. There is a growing dislike of shams and make-believes in every branch of construction and ornamentation, not only because all such deception is dishonest, but what is worse—it smacks of the meagreness of poverty. Something better is demanded, and if it costs more, the public is ready to foot the bill. In many recent specimens of car finishing there are unmistakable indications of a better use of material in the direction referred to. Any first-class passenger car turned out of the shops to-day, upon which any experienced builder has expended his best skill, with no unreasonable restrictions as to cost, is a great improvement upon a car of the same class built twenty or even ten years ago. And in what does the improvement consist? There may not be any new or different material used in the inside finishing, but it has been treated so as to produce a more satisfactory and pleasing effect. There is much less of meaningless detail and doll-baby work, and more of simplicity, solidity and elegance.

It may be urged that costly ornamental work of rare cabinet woods, solid or in the form of veneering, is not essential to cars; that such work is out of place upon such structures, for the reason that they are never at rest, but are always associated with the hurry and clang and turmoil of railway travel—a state of things in the last degree unfavorable to the enjoyment of what is purely artistic in decoration. This is all true enough, but the great traveling public, nevertheless, likes to ride in fine cars, and if they are lined with mahogany and rosewood instead of chestnut and ash, all the better. A railroad corporation would be voted mean and niggardly, and lacking in enterprise, if its cars were not every whit as good as those of its competitors. If people insist upon having art galleries to ride in, and are willing to pay the cost, the roads must supply what is wanted. The market determines the style of the wares that are taken to it. Railway companies keep traveling facilities to sell, and if a miniature palace is called for, it must be forthcoming at any cost, although in its progress over the rails it is liable at any moment to become a shapeless wreck or fuel for the flames.

The introduction of late of what are called the Eastlake and Queen Anne styles, so far as they can be applied to the inside construction of cars, is, as it seems to us, an advance in the right direction. Although to many people these terms convey no very definite meaning, they nevertheless indicate styles of decoration that have a more or less distinctive character. They involve certain principles to be adhered to while the fashion lasts, which is better than a state of chaos. Although more strictly applicable to articles of furniture, they can, to a certain extent, be applied to houses and cars, but in a less positive and characteristic way. What is called the Eastlake style originated in a book printed a few years ago in England, and made up of a series of essays by Mr. C. L. Eastlake. The fundamental principles of the style as applied to furniture construction, are simplicity, honesty and propriety. It is opposed to all sham devices in the use of material, to whatever is fantastic and extravagant in contour, and to all unnecessary curves. As a rule, the material must be used so as to show the construction, with no sacrifice of strength, and harmonizing with the purpose of the article constructed. Solid wood, without veneer and unvarnished, is preferred, put together in the simplest manner, the main outline or frame-work being in all cases chaste and sober in design. The style in its general aspect is quaint, picturesque and full of character, but somewhat stiff and devoid of grace. A car finished in accordance with these principles, and especially if the dark and sombre woods are but sparingly used, produces a very pleasing effect as contrasted with some of the flashy, tawdry, no-style specimens of a dozen or fifteen years ago. The improvement is obvious to the most superficial observer. Were the Eastlake system, however, strictly applied to the entire inner construction, it would involve an important change in the construction of the monitor roof. At present the iron carlines which sustain it, as well as the side roofs, are hidden from sight, and the way the roof is held up is a mystery to the uninitiated. This is, technically, bad construction. The only remedy would be to substitute wooden rafters for the present carlines, and run them from the plates on each side to the opposite upper corners of the raised roof, crossing in the middle. We are aware that there are some grave objections to such an arrangement, but it would be carrying the Eastlake theory to its legitimate result in the inner construction of cars, the effect of which would be complete if the treatment of the sides and ends were also such as to show the construction, or what would be accepted as such. All ornament, strictly speaking, should be accessory and not introduced in such profusion as to hide the base upon which it rests. The construction should be paramount, and the decorative details secondary and subordinate. This is what we understand to be the governing features of the Eastlake style.

The so-called Queen Anne style is not quite so easily defined, but in a general way it may be characterized as a refinement of the Eastlake, with more of grace and detail, but equally devoid of pretense and affectation. Everything is severely square, upright and downright, but without formality or restraint. It is noted for a multiplicity of small, square panel work, little railings, points and pinnacles. There is nothing grandly imposing nor intricate about it, while at the same time it is natural and beautiful, and not devoid of dignity, and can be applied to car work to great advantage.

What we have said has reference to the importance of guiding principles in car ornamentation as the only means of securing more satisfactory results—more economical, and at the same time, more artistic work. Any prevailing style need not become tiresome. There will be, as in all fashions, periodic changes, but no change from what is good to what is bad will long endure.

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HIGH SPEEDS ON RAILWAYS.

It will hardly be denied that as regards fast running, the present styles of locomotives in use in this country have done about all they are capable of doing. Yet there seems to be a pressing demand for higher speed and better time, a demand stimulated by competition between rival lines, and the fact that the average speed of fast trains upon English roads exceeds by a large percentage the average of the same class of trains on our own roads. Under existing conditions, all that can be done to meet this demand is merely to demonstrate that it is possible to run trains a mile a minute with engines of special construction, and even with those of the standard four-driver pattern, upon level and straight tracks, and good road-beds. This, however, is really nothing new. It has been done before, and can be done now, and at any time under the same circumstances and conditions. The trouble is that such performances are exceptional, and are attended with drawbacks that prevent them from becoming the rule. Why is it that the maximum speeds attained on our roads years ago, by engines with a single pair of large driving-wheels, have not been kept up, and the same style of engines used for fast running? Simply because it has proved to be unremunerative. High velocities enormously increase the cost of maintenance of rolling-stock, track and road-bed. There are also mechanical difficulties inherent in this class of engines, but these are perhaps not insurmountable. Engines with one or two pairs of drivers can be made to turn their wheels as fast as most people wish to ride, but until the effects of heavy blows by heavy bodies moving at high speeds can be avoided or neutralized, the traffic will not pay. The small number of locomotives that were built many years ago for fast running on our roads, and with single drivers seven and eight feet in diameter, have all disappeared, or smaller wheels have been substituted for the larger ones. The mile-a-minute speed has been abandoned, and the regular rate of 25 or 30 miles an hour is maintained as the most profitable.

Speed, however, in railroad transportation is extremely desirable. No attainable amount of it will ever be sufficient to satisfy the demands of mails, passengers, and freight. We want all we can get, and if 60 miles an hour is ever to be the rule in this country for fast lines, we shall either have to make our engines and tracks conform to what they are in English practice, or else some radically new locomotive construction must be devised that will enable the machine to be kept at high speeds without destroying itself too rapidly, as well as the cars and track. The climate of England permits of a much more stable roadway than our own, it is more easily kept in alignment, frosts do not penetrate so deeply, there are fewer curves and grades, and cars and engines run more easily upon it. It is a question, however, whether the trains there which habitually make 50 miles an hour, are profitable. The same causes which work against them here must also exist there, although in a less degree. As compared with the regular working velocities of many other kinds of machinery, a speed upon railways of 60 or even 75 miles an hour does not seem to be so very remarkable; but under existing conditions in this country, it cannot be maintained except at a sacrifice which more than offsets the advantages.

According to reports that have been published from time to time, there has been some pretty fast running between Philadelphia and New York. The new special locomotive with two 6½-feet drivers, built for the Reading road, made the whole distance of 89 miles, without stops, at an average speed of of 54¾ miles an hour, although 63 miles an hour was made for a distance of 47 miles where the track was straight and level. The engine was new, however, and not in complete working order. This was over the Bound Brook route. On the New Jersey division of the Pennsylvania road, it is claimed that the same distance has been made in 93 minutes, including four stoppages and a slack-up at two places; also, that some of the regular trains between the two cities make 48 miles an hour, including all the stops. This, although it is a near approximation to the much-vaunted English running, is exceptional with us, and not a routine, every-day matter. An engine in good order, with four 5½-foot drivers, and running with a comparatively light train over the perfect rails and rail-joints and splendidly ballasted track of the Pennsylvania road, can make pretty good time when it runs "on parade," as it were, and just to see what it can do. Fast running, however, should be understood to refer to the regular performance of engines day in and day out, with regular trains and schedules; and in this sense the English big wheel, single engines, with light trains and perfect tracks, will doubtless continue to beat the rest of the world, at least, for the time being.

TESTIMONIALS.

These little tokens of merit figure largely in all the relations of business, and especially in the introduction and sale of the numerous patented inventions that are brought to the attention of railroad men. They form the staple of innumerable circulars and advertisements, and are almost invariable couched in terms of unqualified endorsement and approval. This is well enough if the thing is not overdone. But when it is carried to the verge of exaggeration and even beyond it, as is frequently the case, the result is a positive evil. A false impression is conveyed in regard to what has been overrated, and as the deception will sooner or later be discovered, the general confidence in this class of recommendations is greatly impaired. The testimonial proper is usually worded so as to be gratifying to the receiver. It tells the truth, perhaps, but not alwaya the whole truth. It rarely if ever contains a hint as to any possible defects that might weigh, however lightly, against the obvious merits of what is recommended. Every railroad man of much experience could cite numerous instances in which highly laudatory recommendations of this, that, or the other thing, in the category of supplies and inventions, has turned out to be altogether unwarranted, and would doubtless never have been given had the authors of them acted from actual knowledge of the quality of the wares, Many of these recommendations are doubtless given with reluctance, and under a pressure of one kind or another—to please a friend, avoid giving offense, or to escape from importunity. But they are none the less impositions upon the public; and it is getting to be pretty generally understood that the statements which abound in this kind of literature will not as a rule bear a strictly literal construction. The majority of intelligent business men, however, can readily distinguish the genuine from the bogus variety, by noting the style in which they are written, and the standing of the parties whose names are attached to them. Testimonials in the florid style, with a profusion of superlative epithets, are not calculated to hasten sales; but when kept within truthful and sober limits, they are a paying investment. People then are not so apt to shy at them, or regard them as tricks to entrap the unwary.

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WE frequently receive newspapers containing marked notices of new passenger cars built at road or contract shops. These notices are usually written by local reporters who evidently know little or nothing of car work. Their aim is to be brief, comprehensive and complimentary, and at the same time give the reader a complete idea of the structure described; but in most cases the attempt is a failure. Aside from the commonplaces, the generalities and superfluous words, there is little left in the way of precise description. A kind of vague impression is produced that the car is a very fine one, indeed, replete with all the modern improvements. Whenever the local itemizer goes a little into particulars he is pretty sure to make a mess of it. An illustration of this is shown in a paragraph which has been copied into some of the railway journals, describing some Horton reclining-chair cars built by the Chicago & Alton Railroad Co. One of them has been exhibited at Chicago, and is described in part as followes:

"The outside is of a dark olive color, ornamented with sprays of grass and wheat in gilt and delicate colors, very neatly and tastefully arranged. The car rides on twelve trucks, and is supplied with all the latest improvements in the running gear and outside attachments. The wood work is of light-wood veneering handsomely inlaid and illuminated."

The "twelve trucks" is evidently a slip of the pen, the writer in his haste having overlooked the distinction between the wheels, as a component part of the truck, and the truck itself. If the builders in such cases, or some one familiar with the work, would either prepare a description themselves, or revise and correct the one made by the newspaper man, it would convey to railway men and the public generally a much more correct and satisfactory idea of the fine points in the construction, or whatever else may be really worthy of publication.

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RAILWAY CAR-TRUCKS, considering the service they perform, are wonderful pieces of mechanism, yet the best of them have not quite reached perfection. The defects in their construction, as set forth in an article which we reprint from the *Railroad Gazette*, will be admitted by most railroad men. The practical question is, Are these defects remediable? To say that they are not, would be a reflection upon the mechanical science of the age. Can not new wheels be made round, and two of the same size be put on the same axle? Are journal-boxes so complete as to admit of no further improvement to save waste and wear? Or has a point been reached which admits of no further progress, unless at a cost that would more than offset the accruing benefits? It is much easier, we know, to point out imperfections than to cure them, but in the present case they are not likely to be cured unless they are pointed out.

Veneers and Fancy Woods.

The magnitude and importance of this trade are steadily increasing. The demand for fine furniture for dwelling houses. hotels, public and private offices, steamers, railway cars, churches etc., has caused every part of the world to be explored in search of new varieties of choice woods, while not a few of our domestic woods, hitherto considered of little value, have been found to possess rare qualities for cabinet work. The consumption for ornamental purposes will doubtless be far greater in the future than it is now, as it seems hardly probable that any material will be discovered that will surpass in elegance and beauty the effects produced by rare and diversified woods.

There are many enterprising establishments in New York City that are largely engaged in the trade and whose stock in the aggregate includes the products of all parts of the earth, their supplies being drawn from the East and West Indies, Africa, South America, Spain, Hungary, France, California and elsewhere.

Among these we may mention the firm of J. Copcutt, Son & Co., 432 Washington street, who deal largely in veneers and solid woods, but make a speciality of mahogany, for which there is good demand and ready sale. They are also importer of French walnut, and keep on hand a large line of veeners adapted to car work.

Another firm which has long been in the trade is C. C. Houghton & Sons, 8 Howard street. They deal largely in boards, planks and veneers suitable or car work, making a speciality of mahogany, and oak decorated ceiling. Their facilities for cutting, pressing and drying veneers are of the best description.

Mr. J. H. Monteath, 151 Center street, has an extensive stock of imported solid woods, including mahogany, rosewood, tulip, walnut, white holly, satinwood, boxwood, ebony. etc., and offers special inducements to car-builders.

Geo. W. Read & Co., 186 Lewis street, is another well-known and long-established house in this line. In addition to an extensive stock of woods and veneers, this concern has a board-cutting machine for the manufacture of thin lumber from $\frac{1}{8}$ to $\frac{3}{4}$ of an inch in thickness, and equal in all respect to sawed and planed lumber.

Mr. John R. Graham, 30th street and 11th avenue, also has an extensive supply of fancy cabinet woods in boards, planks and veneers, suitable for car work.

Poor's Railroad Manual, 1880.

The advance sheets of this publication show the total mileage of all the railroads in the United States to be 86,497 miles, which is an increase of 4,721 miles since 1878. The operations reported are for 84,232 miles.

The gross earnings of all the roads whose operations have been reported, are $529,012,999 as against $490,103,351 for 1878. The net earnings are $219,916,724, as against $187,575,167 in 1878, of which $386,676,108 are from freight, and $142,336,191 from passenger traffic. The dividends in 1879 were $61,681,470, as against $53,629,368 in 1878.

The marked feature of the earnings is the continuous reduction of freight charges. Upon 13 leading lines, with a total mileage of 13,821 miles, the tons of freight moved in 1879 are 67,095,549, the receipts from freight $116,311,452, and the average rate per ton per mile 1.02 cts., being an increase since 1873 (nine years) of 21,535,547 tons moved, $4,306,804 in receipts, and a falling off in the average rate per ton per mile of 0.75 ct. This shows that upon these lines there has been within the period named a percentage of decrease in rates nearly equal to the increase in tonnage, and that the continuous and extraordinary increase in tonnage is all that has enabled the railroads to continue the reductions in rates, of which the public reap by far the the largest reward.

The average reduction in the rates per ton per mile on these 13 leading lines during the year 1879, is 0.13 ct., the average rate being 1.15 ct. in 1878, and 1.02 ct. in 1879.

Committees of the Master Car-Builders' Association.

The following are the regular committees appointed to report at the annual meeting in 1881 on the subjects named:

Train Brakes for Freight Cars.
J. P. Coulter, Ohio & Miss. R. R.
Tho. Aylesbury, Kan. City, St. Jo. & C. Bluffs.

Substitution of Steel for Iron and Iron for Wood in Car Construction.
W. R. Davenport, Erie Car Works.
John Kirby, Lake Shore & Mich. Southern.

Improvements in Cars during Current Year.
L. S. Young, Cleve., Col., Cin. & Ind.
W. H. Paige, Wason Car Mf'g Co.

The best Diameter for Cast-Iron and Steel-Tired Car Wheels, and the means that should be adopted to maintain uniform diameters of wheels which are nominally of the same size; and whether the tread of wheels should be cones, and to what extent.
Wm. McWood, Grand Trunk.
Robert Miller, Michigan Central.

To recommend a form and the dimensions for a standard draw-bar and draw-spring, and the best method of bringing about uniformity in their construction, and to investigate and report whether a pair of dead blocks, or a single buffer-block, gives the greatest security to trainmen and protection to freight cars, and to recommend dimensions for each.
W. B. Snow, Illinois Central.
Wm. Campbell, Chicago & Northwestern.
M. P. Ford, Pittsburgh, Cincinnati & St. Louis.

To investigate and report whether it is desirable and economical to apply brakes to all the wheels of freight cars and the best way of bringing about uniformity in their construction, and to recommend forms and proportions for standards for those parts of brakes which require most frequent renewals.
J. W. Marden, New York & New England.
S. A. Davis, Nashua & Lowell.

To investigate the causes of accidents to trainmen, and report what means can be provided to protect train and yard men from injury while in the performance of their duties. (The Yard-Masters' Association is invited to communicate with this committee.)
John Kirby, Lake Shore & Michigan Southern.
J. H. F. Wiers, Atlantic & Great Western.

To investigate and report on the present construction of screws and nuts used on cars, and the amount of accuracy that is desirable to secure and the best means of maintaining it in the standard adopted by the Association in Richmond, Va., June 15, 1871; and to draw up communications addressed to the managers and superintendents of railroads, showing the necessity for the use of even sizes of screw-threads, and the amount of saving, as near as it can be estimated, which will result to the roads by strictly adhering to this practice.
John Ortton, Canada Southern.
M. N. Forney, *Railroad Gazette.*

To draft a circular for distribution embodying the necessities for break-staffs being placed in one position on freight cars.
C. A. Smith, Union Tank Line.
J. N. Mileham, New York, Pennsylvania & Ohio.
C. E. Garey, New York & Harlem.

To gather and present to the Association at its annual meeting in 1881, those facts not involved in the duties of other committees, as in its judgment will be of service to the members of the Association.
D. A. Hopkins, New York City.

Standard Oil-Box and Bearing. (This committee to meet with committee of the Master Mechanics' Association on same subject.
John Kirby, Lake Shore & Mich. Southern.
S. A. Davis, Nashua & Lowell.

Standard Wheel Gauge. (This committee to confer with Civil Engineers of railroads.)
R. C. Blackall, Delaware & Hudson Canal Co.
David Hoit, New York Cent. & Hudson River.
F. D. Adams, Boston & Albany.

To make arrangements for next meeting.
C. A. Smith, Union Tank Line.
Willis Davis, Empire Transp. Co.

Car Ornamentation.

For the past few years, the passenger cars of many of our leading railroads have been highly ornamented; stripes, corner pieces, scrolls, etc., have been used in profusion. Of course, the ordinary coaches did not begin to compare with the drawing-room and sleeping cars, for these are literally one mass of scroll-work and striping.

During the present year, simplicity seems to be all the rage, and one of the great trunk lines of the country, the Pennsylvania Company, has recently introduced a new style of ornamentation, which is as plain as it is neat. The cars are all painted Tuscan red or maroon, after which, instead of the numbers being in the exact centre of the car, they are painted in two places, equidistant from the ends of the car. The panels are here made double-width, about three feet wide. The entire ornamentation and lettering are in gold, with a fine line of black around the figures and along either side of the borders. The word "Pennsylvania" runs along the top of the car, between the roof and windows: with these exceptions the car is entirely devoid of either ornament or stripe. Nearly all the company's cars are now finished in this manner and are much admired by passengers as well as by painters.—*Coach Painter.*

The rapid substitution of steel castings for expensive forgings, and for iron castings where great strength is required, has compelled the doubling of the capacity of the works of the Chester Steel Castings Company during the past year; and now the company announce a still further extension of their establishment. Their chief success, as well as the heaviest part of their business, is in the production of heavy gear wheels, pinions, roll spindles, couplings, coupling-boxes, etc., for rolling-mills and sugar mills. In heavy plate-mills their steel castings outlast many times the iron castings formerly used. It is claimed also that nearly all the locomotive builders and makers of large steam engines are now using the Chester castings, and that the 15,000 crank-shafts and several thousand cross-heads on locomotives of their make show a better record for durability and smoothness of wear than any equal number of forged pieces for the same uses.—*Scientific American.*

Martha's Vineyard.—One of the most delightful trips for summer recreation is from Boston by the Old Colony road to Woods' Holl, and thence by the steamers of that company to Oak Bluffs, the cottage city of America. The sail across the Vineyard Sound is in every way delightful, and the island of Martha's Vineyard, in many of its charming features, is a terrestial paradise. Within its cool groves are myriads of cottages occupied by summer sojourners. There are a thousand or more of these residences in Oak Bluff, some of them very costly and elegant. The concrete drives, fine roads and bathing facilities, are exceedingly attractive, and the hotels are, some of them, without a rival as pleasure resorts. All the sports and pastimes of the fashionable world are here enjoyed with the highest zest, and in the height of the season as many as 40,000 persons have been on the island at a time. The passage from Boston is made twice a day, and the cars and steamers, in the completeness of their appointments, leave nothing to be desired.

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Among its leading specialties are vulcanized rubber fabrics, such as machine belting, steam packing, steam, fire, hydrant and suction hose, car springs, emery wheels, etc., etc.

This company manufactured the immense driving and elevator belts which have been in use at the great Buckingham elevators of Chicago for the past seven years, and still give perfect satisfaction. They also supplied the belting for Vanderbilt's Central R. R. elevators in this city, which are the largest belts in the world.

Largest Book Published.—The new edition of Webster's Unabridged Dictionary, just issued, is believed to be, in the quantity of matter it contains, by far the largest volume published. It now contains about 118,000 words defined, and nearly 15,000 words and meanings not found in any other one dictionary. The Biographical Dictionary, just added, supplies a want long felt by the reader and student, in giving the desired information so briefly. Never was any one volume so complete as an aid in getting an education.

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Our Directory.

We note the following changes since our last issue. Readers are requested to give us prompt notice of changes when they occur:

Chicago & Iowa.—Mr. W. H. Holcomb has again been appointed Receiver, and Mr. George Alexander, who was appointed Superintendent, has turned the property over to him.

Dayton, Covington & Toledo.—This road has been consolidated with the Toledo, Delphos & Burlington.

Galveston, Houston & Henderson.—Mr. H. M. Hoxie has resigned as Vice-President and Manager, and Mr. W. H. Harding has been appointed to succeed him.

Havana, Rantoul & Eastern.—Mr. Jeremiah McCarthy has been appointed Master Mechanic. Office at Rantoul, Ill.

Lake Erie & Western.—Mr. D. S. Hill, late superintendent of the western division, is transferred to the eastern division, in place of Mr. G. G. Hadley, who has gone to the Ohio Central. Mr. M. Clark (formerly on the Illinois Central) succeeds Mr. Hill as superintendent of the western division.

New Jersey Midland.—Mr. W. E. Lewis has resigned the position of superintendent, and Mr. H. M. Britton, late of the New York & New England, has been appointed as his successor.

Ohio Central.—Mr. G. G. Hadley has been appointed Superintendent. He was recently on the Lake Erie & Western road.

Oregon Railway & Navigation Co.—Mr. Charles Phipps has been appointed Master Car-Builder.

Peoria, Pekin & Jacksonville.—The name of this road has been changed to Peoria & Jacksonville.

Quebec, Montreal, Ottawa & Occidental.—Mr. L. A. Senecal has succeeded Mr. C. A. Scott as General Superintendent.

Savannah & Charleston.—The name of this road has been changed to Charlestown & Savannah Railway.

St. Johnsbury & Lake Champlain.—This is the new name of the Portland & Ogdensburg (Vermont Division). Mr. A. B. Jewett is Superintendent and Mr. George E. Howe, Master Mechanic.

Toledo, Delphos & Burlington.—Mr. Jas. Irvine is General Manager; Mr. I. H. Burgoon, Superintendent of the Toledo Division, and Mr. J. O. Arnold, Superintendent of Dayton Division.

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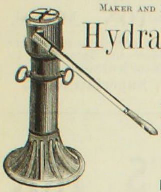

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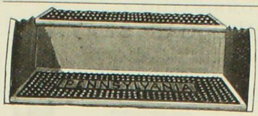
Grand Trunk—L. E. & W., etc.



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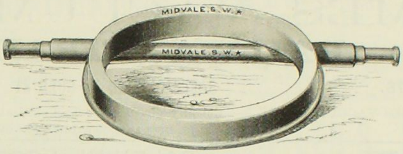
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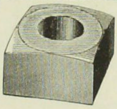

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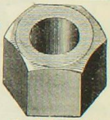

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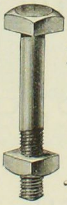

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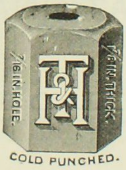

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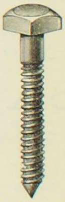

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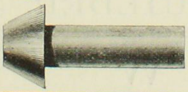

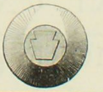

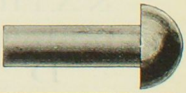

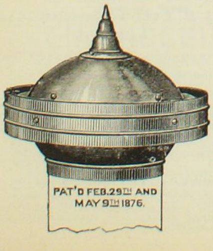
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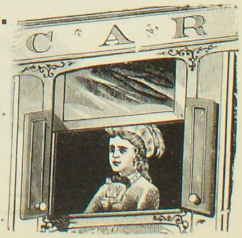

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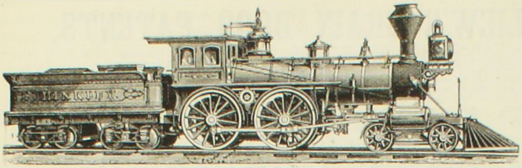

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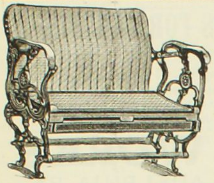

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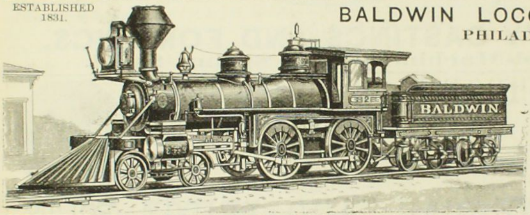

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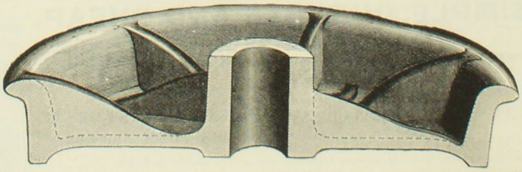

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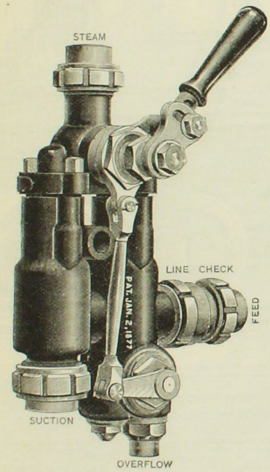

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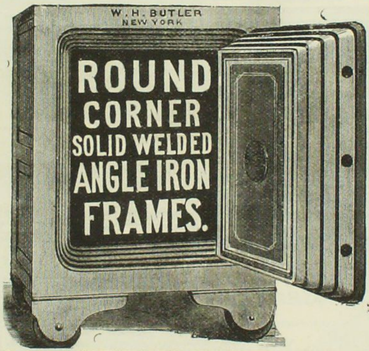

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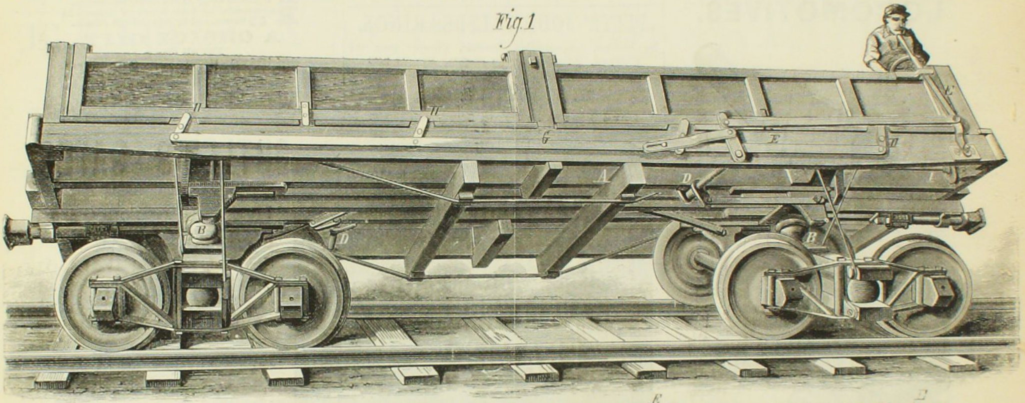


Fig. 2

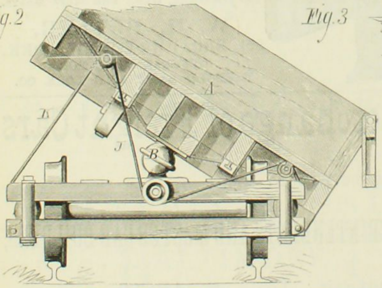
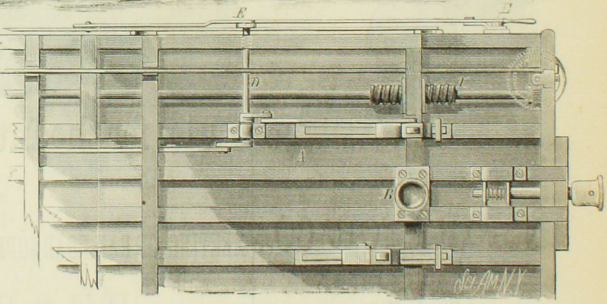


Fig. 3



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We present herewith engravings of a new dumping car, patented by Mr. Matthew Van Wormer, of Dayton, O., and now being introduced by the New England Car Company, of 48 Congress street, Boston, Mass. This car posesses many points of novelty which are covered by separate patents. It has been improved from time to time until, as it now stands, it appears to fulfill all the requirements. In its construction it is as simple as well can be when all of its functions are considered. It is a full-sized gondola car, and capable of running with the same steadiness and security as the ordinary cars of the same size, while at the same time it is as perfectly manageable as a common dumping-wagon.

Fig. 1 shows the entire car in perspective while being dumped; fig. 2 is a vertical transverse section, taken just in front of one of the trucks; and fig. 3 is an inverted plan view, showing the apparatus for moving the side bearings.

This operation removes the side bearings of one side of the car and puts it in position to be dumped. Upon the outer end of the rock shaft there is a lever, E, which is connected with the lever, F, at the side of the car near its end. The lever E is connected with a bar, G, extending along the side of the car, and pivoted to four or more lever catches, H, which hold the side doors of the car in position to retain the load. By this arrangement of the levers and their connections the car doors may be released and the supports, B, moved, making the car ready to dump. The apparatus for dumping the car is very simple and effective, and capable of holding the car platform at any desired angle. It consists of a long shaft, I, extending along the body of the car, and provided at one end with a worm-wheel, which is engaged by a worm on a vertical shaft extending upward through the platform of the car, and provided with a lever or wheel by which it may be turned.

Upon drums carried by the shaft, I, are two drums, upon each of which are wound two chains, J K. The chain, J, runs downward around a sheave on the truck timber, thence upward over a sheave on the car body, then downward to the end of the truck timber, where it is secured. The chain, K, runs directly down to the truck timber. By turning the shaft, I, in one direction the car is dumped on one side of the track, and by turning it in the other direction the load is discharged on the opposite side of the track. This result is secured by winding one of the chains, I J, while the other is unwound. The worm-gear affords ample leverage for operating the shaft, I, so that the car may be dumped by one man standing on the platform.

The merits of this dumping car will be understood and appreciated by railroad engineers, superintendents and managers, who are familiar with the imperfections of the ordinary cars.

Any further information in regard to this invention may be obtained by addressing the New England Car Company, 48 Congress street, Boston, Mass. Mr. Simeon Brownell is general manager and sole agent for the United States.

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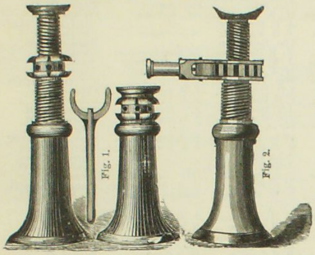

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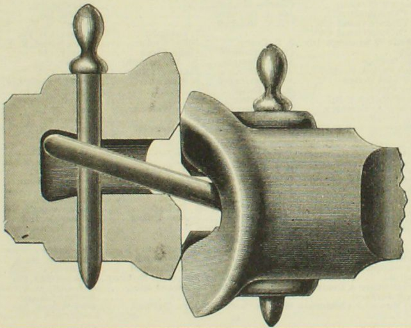

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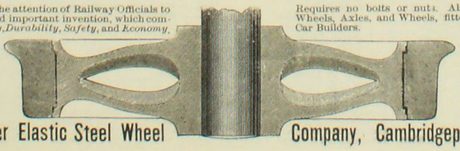

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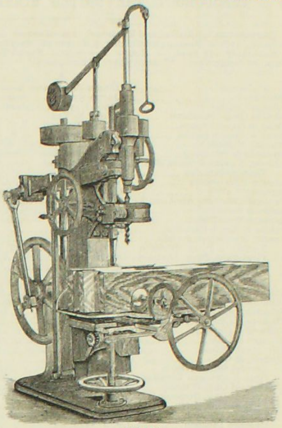

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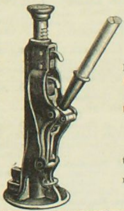

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International & Great Northern	John G. Conlon	‖W. H. Martin	Palestine, Tex.

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Intercolonial	†H. A. Whitney	Edw. Shaffer	Moncton, N. B.
Iron	Perry Scott	Clem. Roetling	Ironton, O.
J			
Jacksonville, Pensacola & Mobile	Jas. D. Hollister		Tallahassee, Fla.
Jeffersonville, Mad. & Indianapolis	Wm. Swanston	‖J. D. McIlwain	Jeffersonville, Ind.
Jacksonville, N. West. & S. East	B. J. Miller		Jacksonville, Ill.
Joplin	P. T. Butterly	P. T. Butterly	Girard, Kan.
Junction & Breakwater	J. A. Maguire		Lewes, Del.
K			
Kansas City, Ft. Scott & Gulf	W. D. Rowley		St. Joseph, Mo.
Kansas City, Fort Scott & Gulf	J. S. McCrum	A. N. Montier	Kansas City, Mo.
Kansas City, Lawrence & South'n	J. S. McCrum		Kansas City, Mo.
Kansas City & Eastern	J. H. Burnham	J. H. Burnham	Independence, Mo.
Kan. City, St. Jo. & Coun. Bluff	Wm. D. Rowley	‖Theo. Aylesbury	St. Joseph, Mo.
Kansas Central	Wm. McCall		Leavenworth, Kan.
Kansas Pacific	**John MacKenzie	T. B. Roberts	Armstrong, Kan.
Kaw Valley Division	James Long		Armstrong, Kan.
Smoky Hill Division	John B. Daily		Ellis, Kan.
Denver Division	R. McDougal	‖John Clock	Denver, Col.
Kentucky Central	J. R. Ledyard	J. L. Hackathorn	Covington, Ky.
Knox & Lincoln	E. Bolton	C. L. Turner	Bath, Me.
L			
Lake Erie & Western	¶¶Everett Clemons		Fremont, Ohio.
Lake Erie & Western	¶H. L. Cooper		Lafayette, Ind.
Lake Ontario Southern	Geo. Thompson	Wm. Currier	Sodus Point, N. Y.
Lake Shore & Michigan Southern	‡James Sedgley	††John Kirby	Cleveland, Ohio.
Michigan Southern Division	Geo. W. Stevens		Elkhart, Ind.
" " "		Frank O. Bray	Adrian, Mich.
Toledo Division	J. M. Sanborn	W. O. Smith	Norwalk, Ohio.
Erie Division	L. O. Gassett	J. Withyecombe	Cleveland, Ohio.
Buffalo Division	Edward Studley	A. C. Robson	Buffalo, N. Y.
Lehigh Valley	John I. Kinsey		South Easton, Pa.
Lehigh Valley	P. Hofecker		Weatherly, Pa.
Lehigh Valley	John Campbell		Delano, Pa.
Lehigh Valley	D. Clark		Hazleton, Pa.
Lehigh Valley	A. Mitchell		Wilkesbarre, Pa.
Lehigh Valley		E. R. Brown	Mauch Chunk, Pa.
Little Rock & Fort Smith	James Eblin	James Malone	Argenta, Ark.
Little Rock, Miss. River & Texas	Joseph Taylor	Joseph Taylor	Arkans's City, Ark.
Los Angeles & Independence	Jas. Velsir	‖J. S. Young	Los Angeles, Cal.
Louisville, New Albany & Chicago	Geo. Ruhlandt	Geo. Ruhlandt	New Albany Ind.
Long Island	§Thos. Meehan	Hugh Longest	L. Isl'd City, N. Y.
Louisville, Cincinnati & Lexing'n	A. Schaeffer	A. Schaeffer	Louisville, Ky.
Louisville & Nashville	**Reuben Wells		Louisville, Ky.
Nashville & Decatur Div	W. H. Thomas	J. P. Furguson	Nashville, Tenn.
South & North Ala. Div	C. W. White		Birmingham, Ala.
Memphis & Ohio Div	Thos. Walsh		Memphis, Tenn.
Clarksville Division	Wm. Adair		Bowling Green, Ky.
Ev., Hen. & Nashville Div	W. H. Thomas		Nashville, Tenn.
M			
Macon & Brunswick	R. Wagnon	R. Wagnon	Macon, Ga.
Maine Central	J. W. Philbrick	J. W. Philbrick	Waterville, Me.
Maine Central		C. H. Kenison	Augusta, Me.
Manchester & Lawrence	J. T. Gordon	J. T. Gordon	Concord, N. H.
Manhattan Beach	Lewis James		Bay Ridge, L. I.
Manhattan Elevated	T. W. Peeples		New York, N. Y.
Marietta & Cincinnati	E. M. Bosley	E. M. Bosley	Chillicothe, Ohio.
Marquette, Houghton & Onton'gn	‖W. H. Williams	H. D. Lyons	Marquette, Mich.
Memphis, Paducah & Northern	G. M. Taylor	G. M. Taylor	Paducah, Ky.
Memphis & Little Rock	Tho. Rennell	P. Twitchell	Argenta, Ark.
Memphis & Charleston	§H. N. Burford	J. J. Kasey	Memphis, Tenn.
Michigan Central	S. H. Edgerly		Jackson, Mich.
Michigan Central		††Robert Miller	Detroit, Mich.
Milwaukee, Lake Shore & West'n	S. Charnly		Manitowoc, Wis.
Minneapolis & St. Louis	Tho. Downing	Tho. Downing	Minneapolis, Minn.
Mineral Point	Robert Hay	Robert Hay	Mineral Pt., Wis.
Mineral Range	George F. Coon		Hancock, Mich.
Mississippi & Tennessee	Geo. Haszinger	S. J. Bolton	Memphis, Tenn.
Missouri & Western	A. C. Persing		Pierce City, Mo
Missouri, Iowa & Nebraska	J. G. Crozier		Alexandria, Mo.
Missouri, Kansas & Texas	H. H. Alexander		Dennison, Texas.
Missouri, Kansas & Texas	**G. W. Cushing	John C. Barber	Sedalia, Mo.
Missouri, Kansas & Texas	Wm. T. Small		Parsons, Kan.
Missouri Pacific	§§John Hewitt	John Hodge	St. Louis, Mo.
Missouri Pacific	R. D. Grant		St. Louis, Mo.
Missouri Pacific	Geo. W. Walshe		Sedalia, Mo.
Missouri Pacific	H. V. Faries		Atchison, Kan.
Mobile & Montgomery	C. W. White	Lewis Barham	Montgomery, Ala.
Mobile & Girard	J. C. Albrecht	A. J. Nix	Columbus, Ga.
Mobile & Ohio	R. H. Briggs	J. T. Booth	Whistler, Ala.
Mobile & Ohio	John Fitzgerald		Macon, Miss.
Mobile & Ohio	M. T. Carson		Jackson, Tenn.
Montgomery & Eufaula	D. M. Gugel	James A. Knight	Macon, Ga.
Morgan's Louisiana & Texas	N. Tilton	Wm. O'Brien	Algiers, La.
N			
Nashua & Lowell	S. A. Davis	S. A. Davis	Nashua, N. H.
Nashville, Chattan'ga & St. Louis	James Cullen	J. G. Sawyer	Nashville, Tenn.
St. Louis Division	L. B. Salisbury	W. H. H. Price	Mt. Vernon, Ill.
Naugatuck	Henry Hanford	George W. Gray	Bridgeport, Ct.
Nebraska	D. Hawksworth		Plattsmouth, Neb.
Newburg, Dutchess & Connecticut	W. G. Vanbuskirk		Dutchess J'n, N. Y.
New Brunswick	P. A. Logan	P. A. Logan	Fredericton, N. B.
New Brunswick & Canada	Tho. Armstrong	G. Houlton	St. Andrew's, N. B.
New Haven & Northampton	Henry Fox	John Sweeny	New Haven, Ct.
New Jersey Midland	‖W. C. Ennis		Wortendyke, N. J.
New Jersey & New York	J. S. Drake		Jersey City, N. J.
New Jersey Southern	Rufus Blodgett		Manchester, N. J.
New Orleans, Texas & Mobile	§Josiah Bettis		Mobile, Ala.
New York, Lake Erie & Western	§§F. M. Wilder		Susquehanna, Pa.
New York, Lake Erie & Western	J. H. Vreeland		Jersey City, N. J.
New York, Lake Erie & Western		‖J. N. Mileham	Jersey City, N. J.
New York, Lake Erie & Western	J. Van Vechten	‖J. Van Vechten	Port Jervis, N. Y.
New York, Lake Erie & Western	V. Blackburn		Susquehanna, Pa.
New York, Lake Erie & Western		‖D. B. Goodell	Elmira, N. Y.
New York, Lake Erie & Western	George H. Griggs		Hornellsville, N. Y.
New York, Lake Erie & Western	Tho. West	‖M. Wilder	E. Buffalo, N. Y.
New York, Lake Erie & Western	‖Jos. Bradt		Rochester, N. Y.
New York & Harlem	Theo. Wheeler		New York, N. Y.
New York & Harlem		C. E. Garey	Morrisania, N. Y.
New York Central & Hud. River		††Leander Garey	New York, N. Y.
New York Central Division	§§G. B. Van Vorst	D. Hoit	West Albany, N. Y.
New York Central Division	§§Henry Watkeys		Syracuse, N. Y.
New York Central Division	§§Amos Gould		E. Buffalo, N. Y.
New York Central Division	§§S. L. White	Richard Donaby	Niagara Falls, N. Y.
New York Central Division		E. A. Olmstead	E. Buffalo, N. Y.
Hudson River Division	§§Wm. Buchanan	Peter Smith	New York, N. Y.
New York Central Division		W. B. White	E. Rochester, N. Y.
New York Central Division		Geo. Cummings	Rochester, N. Y.
New York, Ontario & Western	Edw. Minshull		Middletown, N. Y.
New York & New England	§§Geo. E. Boyden	Elias E. Pratt	Boston, Mass.
Norwich & Worcester Div	Richard Colburn	John W. Marden	Norwich, Ct.
Hartford Division	E. M. Humstone		Hartford, Conn.
New York, N. Haven & Hartford	§§H. Kettendorf	James Denver	New Haven, Ct.
Hartford Division	§§Jno. Henney, Jr.	L. Packard	Hartford, Ct.
New York, Penn. & Ohio	‡William Fuller	††J. H. F. Wiers	Cleveland, O.
New York, Penn. & Ohio	J. A. Cooper	D. S. Dockstader	Meadville, Pa.
New York, Penn. & Ohio	N. Wright	W. G. Huggard	Cleveland, O.
New York, Penn. & Ohio		S. V. Smith	Kent, O.
New York, Penn. & Ohio	William Hill	J. W. Holmes	Galion, O.
New York, Penn. & Ohio		‖J. T. Fosdick	Salamanca, N. Y
New York, Penn. & Ohio		‖Geo. Wilson	Dayton, O.
Northern Central	§§R. H. Soule	‖G. W. Demarest	Baltimore, Md.
Northern Central	J. M. Coale		Baltimore, Md.
Northern Central	James Strode	‖J. C. Dyott	Elmira, N. Y.
Northern New Hampshire	**Jas. N. Lauder		Concord, N. H.
Northern of Canada	Peter Clark	Peter Clark	Toronto, Can.
Northern Pacific	**A. P. Farrar	A. P. Farrar	Brainerd, Minn.
Dakota Division	A. Rupert		Fargo, Dak.
Pacific & P. Oreille Div	C. Z. Sanders	Tho. G. Davis	New Tacoma, W. T.
Northeastern		W. H. Day	Florence, S. C.
North Pacific Coast	James Walch		Saucelito, Cal.
O			
Ogdensburg & Lake Champlain	Abraham Klohs		Malone, N. Y.
Ohio & Mississippi	‡J. F. Sechler		Vincennes, Ind.
Ohio & Mississippi		J. P. Coulter	Aurora, Ind.
Cincinnati Division	John Thumser		Seymour, Ind.
Springfield Division	E. K. Sechler		Pana, Ill.
Old Colony	J. K. Taylor	A. Gleason	Boston, Mass.
B. C. F. & N. Bedford Div	Geo. W. Reynolds	Sam. Stevens	Taunton, Mass.
Oregon & California	§§J. Brandt		Portland, Oregon.
Oregon Railway & Navigation Co	J. F. Curtis	Chas. Phipps	Dalles, Oregon.
P			
Paducah & Elizabethtown	W. D. Robb	W. D. Robb	Elizabethtown, Ky.
Painesville & Youngstown	J. H. Jones		Painesville, O.
Panama	Thos. S. O'Brien		Aspinwall, U. S. C.
Parker & Karns City	Philip Davies	Wm. Wolford	Parker City, Pa.
Pensacola & Selma	R. H. Kelly		Selma, Ala.
Pennsylvania	§§T. N. Ely		Altoona, Pa.
Pennsylvania	H. D. Garrett	I. W. Van Houten	W. Philadelphia, Pa
Pennsylvania	E. L. Caum	Samuel W. Myers	Harrisburg, Pa.
Pennsylvania	G. W. Strattan	John P. Levan	Altoona, Pa.
Pennsylvania	D. O. Shaver	J. G. Stewart	Pittsburg, Pa.
New Jersey Division	L. A. Bosdevex	E. F. Bosdevex	Meadow Shops, N. J.
New Jersey Division		David H. Baker	Jersey City, N. J.
New Jersey Division	§§H. S. Hayward		Jersey City, N. J.
New Jersey Division	Tho. Kerr	P. S. Bogart	So. Amboy, N. J.
New Jersey Division	R. McDowell		Lambertville, N. J.
New Jersey Division	W. McAllister		Camden, N. J.
West Penn. Division	C. B. Street	M. H. Fails	Blairsville, Pa.
Peoria, Decatur & Evansville	Isaac Adams		Pekin, Ill.
Peoria, Pekin & Jacksonville	R. F. Hurd	R. F. Hurd	Pekin, Ill.
Peoria & Springfield	E. Deizerdt	E. Deizerdt	Peoria, Ill.
Petersburg	R. B. Andrews	J. W. Fleming	Petersburg, Va.
Philadelphia, Wilmington & Balt	S. A. Hodgman	Wm. Lungren	Wilmington, Del
Philadelphia & Atlantic City	J. W. Wright	E. Lippincott	Camden, N. J.
Philadelphia & Erie	§§Howard Fry		Williamsport, Pa.
	W. F. Beardsley		Sunbury, Pa.
	W. L. Forster		Renovo, Pa.
	W. L. Holman		Kane, Pa.
	W. T. Smith		Erie, Pa.
Philadelphia & Baltimore Central	S. D. Danfield	S. D. Danfield	Chester, Pa.
Philadelphia & Reading	*L. B. Paxson	John H. Rankin	Reading, Pa.
Catawissa Branch	W. H. Ellis	C. D. Ellis	Catawissa, Pa.
Germantown & Norris'n Div	Jackson Richards		Philadelphia, Pa.
North Penn. Division	Jackson Richards	C. W. Hammann	Philadelphia, Pa.
Del. & Bound Brook Div	Jackson Richards		Philadelphia, Pa.
Southeastern (Canada)	Edwin Goss		Richford, Vt
Piedmont Air Line	‡R. D. Wade		Richmond, Va.
Rich. & Danville Div		J. B. Vaughan	Richmond, Va.
North Carolina Div		J. C. Holt	Comp. Shops, N. C.
Pittsburg, Cincinnati & St. Louis	§§G. W. Rhodes		Columbus, O.
Little Miami Division	J. H. Setchel	John McVay	Cincinnati, O.
Little Miami Division		M. P. Ford	Columbus, O.
Col., Cin. & Ind. Division	Robert Curtis	‖Tho. Chamberlin	Columbus, O.
Col., Cin. & Ind. Div	Geo. H. Prescott	‖Chas. H. Starr	Logansport, Ind.
Col. Cin. & Ind. Division	‖C. M. St. Clair		Indianapolis, Ind.
Cin. & Musk. Val. Division	Leroy Kells	‖Daniel Jewell	Lancaster, O
Pitts. Cin. & St. Louis Divis'n	Ross Kells		Denison, O.
Pitts. Cin. & St. Douis Divis'n		‖A. K. Mansfield	Steubenvill, O.
Pittsburg, Fort Wayne & Chicago	Geo. J. Parkin	John Marquis	Allegheny, Pa.
Pittsburg, Fort Wayne & Chicago	J. M. Boon	Israel Lee	Fort Wayne, Ind
Pittsburg, Fort Wayne & Chicago		J. J. Kirkland	Crestline, O.
Pittsburg, Titusville & Buffalo	H. J. Bookhammer	John Monks	Oil City, Pa.
Pittsburg, Virginia & Charleston	Wm. Lininger		Pittsburg, Pa.
Pittsburg & Lake Erie	S. W. Haines		Pittsburg, Pa.
Portland & Ogdensburg	Geo. H. Poor	W. G. Brewer	Portland, Me.
Portland & Rochester	E. H. C. Tompson	David Dow	Portland, Me.
Port Dover & Lake Huron	H. M. Aldrich		Woodstock, Ont.
Port Royal & Augusta	Geo. Riley	J. H. Milton	Port Royal, S. C.
Poughkeepsie, Hartford & Boston	John L. Driscoll		Poughkeepsie, N. Y
Prince Edward Island	A. Stronach	‖D. M. Fraser	Charlottet'n, P. E. I
Providence & Springfield	G. T. Richardson		Pascoag, R. I.
Providence & Worcester	A. Griggs	A. Griggs	Providence, R. I.
Providence, Warren & Bristol	Rufus Smith	J. Brightman	Bristol, R. I.
Q			
Quebec, Mont., Ottawa & Occidental	†A. Davis		Montreal, Can.
Quincy, Missouri & Pacific			Kirksville, Me.
R			
Raleigh & Augusta Air-Line	**B. R. Harding		Raleigh, N. C.
Raleigh & Gaston	**B. R. Harding	B. R. Harding	Raleigh, N. C.
Rhinebeck & Connecticut	A. W. Quackenbush	John H. Decker	Rondout, N. Y.
Rich., Fredericksburg & Potomac	H. Khun	W. H. Trainham	Richmond, Va.
Richmond & Danville	See Piedmont Air-Line.		
Richmond & Petersburg	John O'Brien	H. L. Carter	Richmond, Va.
Rich., York River & Chesapeake	A. B. Armstrong	A. B. Armstrong	Richmond, Va.
Rio Grande	G. W. Rendall	M. Markwood	Brownsville, Tex.
Rochester & State Line	A. J. Robbins		Rochester, N. Y.
Rock Island & Peoria	Joseph Elder		Peoria, Ill.
Rome, Watertown & Ogdensburg	Geo. H. Hazleleton	Geo. H. Hazelton	Oswego, N. Y.
Rome, Georgia	O. W. Harbin	O. W. Harbin	Rome, Ga.
S			
Saginaw Valley & St. Louis			St. Louis, Mich.
San Francisco & Northern Pacific	Ed. Reynolds	H. C. Whiting	Donahue, Cal.
Savannah, Florida & Western	§Charles Collins	P. N. Raynall	Savannah, Ga.
Savannah & Memphis	R. A. Bridges		Opelika, Ala.
Scioto Valley	C. H. Cory	C. H. Cory	Portsmouth, O.
Seaboard & Roanoke	§§M. M. Pendleton		Portsmouth, Va.
Selma, Rome & Dalton	B. J. Sitton	W. W. Pierce	Selma, Ala.
Selma, Marion & Memphis	J. M. Levis		Marion, Ala.
Sheboygan & Fond du Lac	John Hickey	John Hickey	Sheboygan, Wis.
Shenango & Allegheny	Edw. Richardson		Greenville, Pa.
Shepaug	C. M. Allen		Litchfield, Ct.
Sioux City & Pacific	C. H. Foster	C. H. Foster	Missouri Valley, Ia.
Sioux City & St. Paul	F. C. Butterfield	F. C. Butterfield	Shakopee, Minn.
Southern Pacific.			
Northern Division	J. T. Wilson	F. N. Bellisle	San Francisco, Ca
Los Angeles & Yuma Div	Jas. Velsir	‖J. S. Young	Los Angeles, Cal.
Tulare Division	S. Johnson		Tulare, Cal.
South Carolina	§P. J. Cochrane	Geo. H. Gramling	Charleston, S. C.
Southern Central	Chas. G. Brown	H. Mooney	Auburn, N. Y.
Southwestern of Georgia	D. M. Gugel	James A. Knight	Macon, Ga.
South Pacific Coast	Martin Carter	Martin Carter	Newark, Cal.

Railroad.	*Master Mechanic.*	*Master Car Builder.*	*Residence.*
Spartanburg, Union & Columbia	Wm. Platt	W. B. Brown	Spartanburg, S. C.
Spartanburg & Asheville	M. Fraser	W. B. Brown	Spartanburg, S. C.
Springfield, Athol & Northeastern	W. E. Granger		Springfield, Mass.
Springfield Southern	F. W. Johnstone		Springfield, O.
State Line & Sullivan	J. O. Blight		Towanda, Pa.
Stockton & Copperopolis	John M. Fulton		Stockton, Cal.
Stonington & Providence	J. H. Anderson	J. H. Anderson	Providence, R. I.
St. Croix & Penobscot	G. H. Corsen	H. C. Tincker	Milltown, Me.
St. Johns	Jas. M. Owens		St. Augustine, Fla.
St. Johnsbury & Lake Champlain	Geo. E. Howe		St. Johnsbury, Vt.
S. Joseph & Des Moines	W. D. Rowley		St. Joseph, Mo.
St. Joseph & Western	E. Sleppy	E. Sleppy	So. St. Joseph, Mo
St. Lawrence & Ottawa	Calvin Dame	Calvin Dame	Prescott, Canada.
St. Louis, Iron Mount. & So.	**O. A. Haynes	Oscar Doolittle	St. Louis, Mo.
Arkansas Division	L. Finlay	L. Finlay	Little Rock, Ark.
Missouri Division	W. H. Harris		De Soto, Mo.
St. Louis, Alton & Terre Haute	**Beriah Warren.		St. Louis, Mo.
St. Louis, Salem & Little Rock	Thomas Everson	A. W. Grosvernor	Steelville, Mo.
St. Louis & San Francisco	M. Kearney		N. Springfield, Mo.
St. Louis, Keokuk & Northwest'n	Wm. Foley		Keokuk, Iowa.
St. Paul & Duluth	W. McFarland	John Hill	St. Paul, Minn.
St. Paul, Minneapolis & Manitoba	J. C. Munro	J. C. Munro	St. Paul, Minn.
St. Paul & Sioux City	F. C. Butterfield	F. C. Butterfield	Shakopee, Minn.
Sussex	E. H. Osborn.	R. L. Sutton	Newton, N. J.
Syracuse, Binghamton & N. Y.	James Buchanan	James Buchanan	Syracuse, N. Y.
Syracuse, Chenango & New York	Geo. W. West		Syracuse, N. Y.

T

Railroad.	*Master Mechanic.*	*Master Car Builder.*	*Residence.*
Tennessee & Pacific	William McKeand	William McKeand	Nashville Tenn.
T. H. & Indianapolis. Vandalia Line.	§§C. R. Peddle	E. D. Carter	Terre Haute, Ind.
Indianapolis Div.	Clinton Idler		Indianapolis, Ind.
Vandalia Div.	Chas. Butler		Effingham, Ill.
Logansport Division	A. J. Prescott	H. L. Clark	Logansport, Ind.
Texas & New Orleans	E. A. Campbell		Houston, Texas.
Texas & Pacific	H. J. Small	F. M. Alexander	Marshall, Texas.
Tioga & Elmira State Line	Pere Bonny	D. H. Stratton	Blossburg, Pa.
Toledo, Delphos & Burlington	Geo. H. Tier		Delphos, O.
Toledo, Peoria & Western	W. O. Hewitt	R. M. Hemphill	Peoria, Ill.
Toronto, Grey & Bruce	†David Preston		Toronto, Can.
Toronto & Nipissing	J. Haggas		Toronto, Can.
Troy & Boston	Z. B. Davis	R. V. Coon	Troy, N. Y.
Ulster & Delaware	J. B. Dykeman	Jno. H. Decker	Rondout, N. Y.

U

Railroad.	*Master Mechanic.*	*Master Car Builder.*	*Residence.*
Union Pacific	§I. H. Congdon	‡‡Geo. E. Stevens	Omaha, Neb.
Eastern Division		A. M. Collett	Omaha, Neb.
Eastern Division		H. P. Makely	Grand Island, Neb.
Mountain Division	T. A. Davis	John E. Davis	Cheyenne, Wg. T.
Laramie Division		Floyd Heavaner	Laramie, Wg. T.
Western Division		R. V. Brinkley	Evanston, Wg. T.
Colorado Division	James S. Scott	E. G. Thomas	Golden, Col.
Union Railway & Transit Co.	H. M. Smith		St. Louis, Mo.
Utah Central	W. B. Armstrong	Sam. S. Tucker	Salt Lake City.
Utah Western	Robert Anderson		Salt Lake City, U.
Utica & Black River	John Bailey	David James	Utica, N. Y.
Utica, Ithaca & Elmira	Geo. W. Cleveland	F. W. Magargil	Breesport, N. Y.

V

Railroad.	*Master Mechanic.*	*Master Car Builder.*	*Residence.*
Vicksburg & Meridian	Jas. B. Browne		Vicksburg, Miss.
Vicksburg, Shreveport & Pacific	C. H. Tull		Monroe, La.
Virginia & Truckee	I. N. Fording		Carson, Nev.

W

Railroad.	*Master Mechanic.*	*Master Car Builder.*	*Residence.*
Wabash, St. Louis & Pacific	Chauncey Morris		Fort Wayne, Ind.
Wabash, St. Louis & Pacific	Jacob Johann	B. B. Rose	Springfield, Ill.
Wabash, St. Louis & Pacific		U. H. Kohler	Toledo, Ohio.
Wallkill Valley	A. W. Quackenbush	Jno. H. Decker	Rondout, N. Y.
Wash. City, Va. Mid. & G. South	Jas. E. Waddey	J. T. Nalls	Alexandria, Va.
Washington & Ohio	Edward Dunn	John Harrison	Alexandria, Va.
Welland	James Taylor	Wm. H. Pay	St. Catharine, C. W.
Westchester & Philadelphia	John Moyer	Nathan Pawling	Philadelphia, Pa.
Western & Atlantic	John H. Flynn	W. G. Grambling	Atlanta, Ga.
Western Maryland	§David Holtz	J. H. Nussear	Union Bridge, Md.
Western North Carolina	Geo. W. Gates		Salisbury, N. C.
Western, of Alabama	Robert King	F. M. Wade	Montgomery, Ala.
Western R. R. N. C.	Isaac W. Clark	Isaac W. Clark	Fayetteville, N. C.
Western Union	John Taylor	E. A. Eddy	Racine, Wis.
West Feliciana	J. A. Tilton	Wm. McKelvey	Laurel Hill, La.
West Jersey	W. McAllister	C. C. Williams	Camden, N. J.
White Water	§L. W. Wingert		Harrison, O.
Wilmington, Columbia & Augusta	John Bisset	W. H. Day	Florence, S. C.
Wilmington & Welden	John Bisset	C. R. Clowe	Wilmington, N. C.
Wisconsin Central	G. Campbell	J. L. Adam	Stevens' P't, Wis.
Worcester & Nashua	John G. Brady	John G. Brady	Worcester, Mass.

Directory of Railway Superintendents and Purchasing Agents

THROUGHOUT THE UNITED STATES AND CANADA.

REFERENCES.—* General Manager. † Managing Director. ‡ Assistant General Superintendent. § Assistant Superintendent. ** Superintendent of Transportation. §§ Assistant General Manager.

A

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
Adirondack	C. E. Durkee		Saratoga, N. Y.
Alabama Central	John M. Bridges		Selma, Ala.
Alabama Great Southern	Chas. P. Ball	R. W. Healey	Chattanooga, Tenn.
Albany & Susquehanna	*C. F. Young		Honesdale, Pa.
Alleghany Valley	David McCargo	David McCargo	Pittsburg, Pa.
Anderson, Lebanon & St. Louis	Jas. A. Larnerd		Anderson, Ind.
Arkansas Midland	*A. H. Johnson		Helena, Ark.
Ashtabula & Pittsburg	D. B. McCoy		Ashtabula, O.
Atchison, Topeka & Santa Fe	*W. B. Strong	F. M. Smith	Topeka, Kan.
Western Division	W. W. Borst		Nickerson, Kan.
Eastern Division	D. J. Chase		Topeka, Kan.
Atchison & Nebraska	*A. E. Touzalin		Omaha, Neb.
Atlanta & Charlotte Air Line	*G. J. Foreacre	G. J. Foreacre	Atlanta, Ga.
Atlanta & West Point	L. P. Grant		Atlanta, Ga.
Atlantic & North Carolina	A. B. Andrews		Newbern, N. C.
Atlantic, Mississippi & Ohio		J. P. Minetree	Petersburg, Va.
Atlantic, Tennessee & Ohio	J. J. Gormley		Charlotte, N. C.

B

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
Baltimore & Ohio	**W. M. Clements.	N. S. Hill.	Baltimore, Md.
Ohio & Chicago Division	C. H. Hudson		Chicago, Ill.
Pittsburg Division	G. M. Serpell		Connellsville, Pa.
Baltimore & Potomac	Geo. C. Wilkins	A. W. Sumner	Baltimore, Md.
Bangor & Piscataquis	Arthur Brown		Bangor, Me.
Bath & Hammondsport	M. A. Hall		Hamm'dsp't, N. Y.
Bedford, Sp'gville, Owensb'g & Bd.	Jas. W. Kennedy	Jas. W. Kennedy	Bedford, Ind.
Bellefonte & Snow Shoe	Daniel Rhoads		Bellefonte, Pa.
Bell's Gap	Robert G. Ford		Bellwood, Pa.
Bennington & Rutland	F. C. White	F. C. White	Rutland, Vt.
Blairstown	J. D. Vail		Blairstown, N. J.
Boston, Revere Beach & Lynn	E. H. Whorf		Boston, Mass.
Boston & Albany	*Wm. Bliss		Boston, Mass.
Boston & Albany	C. O. Russell		Springfield, Mass.
Boston & New York Air Line	Jos. H. Franklin		New Haven, Conn.
Boston & Providence	A. A. Folsom	A. A. Folsom	Boston, Mass.
Boston, Concord & Montreal	*J. A. Dodge		Plymouth, N. H.
Boston, Concord & Montreal	§W. A. Stowell	J. Thomas Vose.	Boston, Mass.
Boston, Hoosac Tunnel & Western	E. B. Burnham		N. Adams, Mass.
Boston & Maine	J. T. Furber	M. E. Wood	Boston, Mass.
Boston & Lowell	A. A. Hobart	F. H. Nourse	Boston, Mass.
Boston, Barre & Gardner	H. M. Witter	H. M. Witter	Worcester, Mass.
Brooklyn, Flatbush & Coney Isl'd.	W. E. Dorwin		Brooklyn, N. Y.
Brunswick & Albany	C. L. Schlotter		Brunswick, Ga.
Burlington & Mo. River (in Neb.)	*A. E. Touzalin	G. Hargreaves	Omaha, Neb.
Burlington & Mo. River (in Neb.)	Geo. W. Holdrege		Lincoln, Neb.
Burlington, Cedar Rapids & Nor'n.	C. J. Ives	Rob't Williams	Cedar Rapids, Ia.
Burlington & Northwestern	John F. Gerry	John F. Gerry	Burlington, Ia.
Burlington & Southwestern	J. W. Smith	J. W. Smith	Burlington, Ia.
Buffalo & Southwestern	*John F. Moulton		Buffalo, N. Y.
Buffalo, New York & Philadelphia	Geo. S. Gatchell	J. H. Pool	Buffalo, N. Y.

C

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
Cairo & St. Louis	*L. M. Johnson	L. M. Johnson	St. Louis, Mo.
Cairo & Vincennes	Roswell Miller	T. W. Fitch	Cairo, Ill.
California Pacific & Northern	§J. A. Fillmore		Sacramento, Cal.
Camden & Atlantic	F. A. Lister	F. A. Lister	Camden, N. J.
Canada Central	T. A. McKinnon		Brockville, Can.
Canada Southern	*Wm. P. Taylor	A. F. Howland	St. Thomas, Ont.
U. S. Division	E. P. Murray		Toledo, O.
Canada Division	W. E. Carroll		St. Thomas, Ont.
Canadian Pacific	J. F. Lynskey		Winnepeg, Man.
Carbondale & Shawneetown	R. J. Cavett		Carbondale, Ill.
Carolina Central	V. Q. Johnson	C. H. Roberts	Wilmington, N. C.
Catasauqua & Fogelsville	C. W. Chapman	C. W. Chapman	Catasauqua, Pa.
Cayuga Southern	W. Stevenson		Sayre, Pa.
Cayuga & Susquehanna	W. R. Humphreys		Ithaca, N. Y.
Cazenovia, Canastota & De Ruyter	John Stebbins		Cazenovia, N. Y.
Central Pacific	*A. N. Towne		San Francisco, Cal.
Central Pacific	‡E. C. Fellows		San Francisco, Cal.
Central Pacific		J. R. Watson	Sacramento, Cal.
Western & Visalia Divisions	A. D. Wilder		Oakland, Cal.
Truckee Division	Frank Free		Wadsworth, Nev.
Humboldt Division	G. W. Coddington		Carlin, Nev.
Salt Lake Division	A. G. Fell		Ogden, Utah.
Sacramento & Oregon Div.	R. H. Pratt		Sacramento, Cal.
Central Vermont	J. W. Hobart		St. Albans, Vt.
Central Vermont	‡J. M. Foss		St. Albans, Vt.
Western Division	John Schrier		Ogdensburg, N. Y.
Central & Southern Division			St. Albans, Vt.
Rutland Division	J. Burdett		Rutland, Vt.
New London Northern	G. W. Bentley	G. W. Bentley	New London, Conn.
Central of Georgia	Wm. Rogers	Henry Yonge	Savannah, Ga.
Atlanta Division	W. F. Shellman		Macon, Ga.
Central of Iowa	D. N. Pickering	D. N. Pickering	Marshalltown, Ia.
Central of New Jersey	James Moore	B. W. Burnet	Elizabeth, N. J.
Central Division	W. W. Stearns		Elizabeth, N. J.
Lehigh & Susq. Division	W. S. Polhemus		Mauch Chunk, Pa.
Champaign, Havana & Western	A. H. Wood		Urbana, Ill.
Charleston & Savannah	C. S. Gadsden		Charleston, S. C.
Charlotte, Columbia & Augusta	Jno. G. Clarke		Columbia, S. C.
Chepaug	C. H. Platt	C. H. Platt	Litchfield, Conn.
Chesapeake & Ohio	W. M. S. Dunn	J. A. Netherland	Richmond, Va.
Cheraw & Darlington	J. F. Divine		Society Hill, S. C.
Cherokee	John Postell		Atlanta, Ga.
Cheshire	R. Stewart	H. H. Stone	Keene, N. H.
Chester & Lenoir	James Mason		Chester, S. C.
Chicago & Northwestern	*Marvin Hughitt	R. W. Hamer	Chicago, Ill.
Chicago & Northwestern	J. S. Oliver		Chicago, Ill.
Chicago & Northwestern	§Chas. C. Wheeler		Chicago, Ill.
Wisconsin & Mill. Division	E. J. Cuyler		Chicago, Ill.
Peninsula Division	W. B. Lindsay		Escanaba, Mich.
Madison Division	C. A. Swineford		Baraboo, Wis.
Galena Division	Chas. Murray		Chicago, Ill.
Des Moines & Iowa Division	J. M. Whitman		Clinton, Iowa.
Winona & St. Peter Division	S. Sanborn		Winona, Minn.
Galena & Wisconsin Br.	J. B. Trull		Galena, Ill.
Chicago & Alton	J. C. McMullen	A. V. Hartwell	Chicago, Ill.
Chicago & Alton	‡C. H. Chappell		Bloomington, Ill.
Chicago Division	A. M. Richards		Chicago, Ill.
St. Louis Division	T. M. Bates		Roodhouse, Ill.
Kansas City Division	J. H. Wood		Kansas City, Mo.
Chicago & Block Coal	*A. F. Beach		Veedersburg, Ind.
Chicago, Burlington & Quincy	*Thos. J. Potter	Wm. Irving	Chicago, Ill.
Chicago, Burlington & Quincy	§John D. Besler		Galesburg, Ill.
Chicago, Burlington & Quincy	§E. Ryder		Chicago, Ill.
Chicago Division			Chicago, Ill.
Middle, Galesb'g & Q'y Div.	H. Hitchcock		Galesburg, Ill.
St. Louis & R. Isl'd Division	W. R. Crumpton		St. Louis, Mo.
Iowa Division	W. C. Perkins		Burlington, Iowa.
Chi., Clinton, Dubuque & Minn.	*F. O. Wyatt	F. O. Wyatt	Dubuque, Iowa.
Chicago & Eastern Illinois	O. S. Lyford	O. S. Lyford	Chicago, Ill.
Chicago & Iowa	W. H. Holcomb, *Rec*		Rochelle, Ill.
Chicago & Northeastern	J. M. Turner		Lansing, Mich.
Chicago & Pacific	*J. M. Whitman	James Penny	Chicago, Ill.
Chicago & Paducah	D. H. Conklin		Streator, Ill.
Chicago & Paducah		C. L. Rising	Chicago, Ill.
Chicago, St. Louis & New Orleans	*J. C. Clarke	J. C. Febiger, Jr.	New Orleans, La.
South Division	W. P. McKinley		McComb City, Miss.
North Division	J. G. Mann		Jackson, Tenn.
Chicago, Rock Island & Pacific	A. Kimball		Davenport, Iowa.
Chicago, Rock Island & Pacific	‡A. Manvel	A. Manvel	Chicago, Ill.
Southwestern Division	G. F. Walker		Trenton, Mo.
Iowa Division	H. F. Royce		Des Moines, Iowa.
Keokuk & Des Moines Div.	John Givin		Keokuk, Ia.
Chicago & West Michigan	§C. M. Lawler		St. Joseph, Mich.
Chicago, Milwaukee & St. Paul	W. C. Van Horne	J. T. Crocker	Milwaukee, Wis.
Ch., LaCrosse & P. du C. Div.	H. C. Atkins		Milwaukee, Wis.
Northern Division	L. B. Rock		Milwaukee, Wis.
I. & M., & I. D. Division	C. H. Prior		Minneapolis, Minn.
Wabasha Division	J. H. Lakey		Wabasha, Minn.
Western Union Division	D. A. Olin		Racine, Wis.
Sioux City & Dak. Div.	G. E. Merchant		Sioux City, Ia.
Southern Minnesota Div.	J. M. Egan	J. M. Egan	La Crosse, Wis.
Chicago, Pekin & Southwestern	J. Murray	C. L. Rising	Chicago, Ill.
Chicago, Pekin & Southwestern			Streator, Ill.
Chicago, St. Paul & Minneapolis	E. W. Winter		St. Paul, Minn.
Chicago & Grand Trunk	Henry Funnell		Battle Creek, Mich.
Chicago & Grand Trunk		N. Wall	Port Huron, Mich.
Chippewa Falls & Western	L. C. Stanley		Chip'wa F'lls, Wis.
Cincinnati & Eastern	George H. Wilber		Batavia, O.
Cincinnati, Wabash & Michigan	*Norman Beckley	Norman Beckley	Elkhart, Ind.
Cincinnati, Richmond & Chicago	*Lewis Williams		Cincinnati, O.
Cincinnati, Rockp't & Southwest'n.	H. C. Branham	H. C. Branham	Rockport, Ind.
Cincinnati & Terre Haute	John Holland		Terre Haute, Ind.
Cin., Cumber'd Gap & Charleston	W. J. Taylor		Knoxville, Tenn.
Cincinnati, Hamilton & Dayton	Lewis Williams	Lewis Williams	Cincinnati, O.
Cin., Hamilton & Indianapolis	Lewis Williams		Cincinnati, O.
Cincinnati, Lafayette & Chicago	J. W. Sherwood		Cincinnati, Ohio.
Cin., Sandusky & Cleveland	*D. W. C. Brown	Frank Herriman	Sandusky, O.
Cincinnati Southern	Sam'l Woodward	C. M. Woodward	Cincinnati, O.
Cin., Indianapolis, St. Louis & Chi.	J. W. Sherwood		Indianapolis, Ind.
Cin., Indianapolis, St. Louis & Chi.		George Tozzer	Cincinnati, O.
Cleve., Col., Cin. & Indianapolis	*E. B. Thomas	J. L. Yale	Cleveland, O.

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
Indianapolis Division	C. C. Gale		Indianapolis, Ind
Col. and Cincinnati Divs	Robert Blee		Cleveland, O.
Cleveland & Marietta	S. C. Baldwin	R. B. Hoover	Marietta, Ohio.
Cleveland & Pittsburg	John Thomas		Cleveland, O.
Cleveland & Pittsburg	*J. D. Layng	Wm. Mullins	Pittsburg, Pa.
Cleveland, Mt. Vernon & Columb's	G. A. Jones		Mt. Vernon, O.
Cleve., Tuscarawas Val. & Wheel.	*Oscar Townsend		Cleveland, O.
Cobourg, Petersboro & Marmora	James R. Barber	J. R. Barber	Cobourg, Ont.
Columbus & Hocking Valley.	Orland Smith		Columbus, O.
Columbus & Toledo	Orland Smith	Geo. R. Carr	Columbus, O.
Columbus & Rome	T. J. Nuckolls		Columbus, Ga.
Concord & Claremont	George E. Todd		Concord, N. H.
Concord	H. E. Chamberlin	H. E. Chamberlin	Concord, N. H.
Concord & Portsmouth	H. E. Chamberlin		Concord, N. H.
Connecticut Central	D. D. Warren, Pres		Springfield, Mass.
Connecticut River	John Mulligan	John Mulligan	Springfield, Mass.
Connecticut Valley	Samuel Babcock		Hartford, Conn.
Connecticut Western	J. F. Jones		Hartford, Conn.
Connecticut & Passumpsic Rivers	H. E. Folsom		Lyndonville, Vt.
Corning, Cowanesque & Antrim	A. H. Gorton		Corning, N. Y.
Covington, Col. & Black Hills	J. I. Booge		Sioux City, Iowa.
Cumberland Valley	J. F. Boyd	O. N. Lull	Chambersburg, Pa.
Cumberland & Pennsylvania	P. L. Burwell	P. L. Burwell	Cumberland, Md.
Cumberland & Maurice River	L. H. Dowdney		Port Norris, N. J.
	D		
Danbury & Norwalk	L. W. Sandiforth		South Norwalk, C.
Danville & Southwestern	James A. Eads		Paris, Ill.
Davenport & Northwestern	D. Flanigan		Davenport, Ill.
Dayton & Michigan	J. H. Weller		Dayton, O.
Dayton & Union	C. C. Gale		Indianapolis, Ind.
Dayton & Southeastern	J. E. Gimperling, *Rec*	E. F. Pryor	Dayton, O.
Delaware & Chesapeake	O. S. Sanford		Easton, Md.
Delaware & Hudson Canal Co.	R. Manville	J. White Sprong	Albany, N. Y.
Delaware & Hudson Canal Co.	*C. F. Young		Honesdale, Pa.
Albany & Susq. Division	C. D. Hammond		Albany, N. Y.
Rensselaer & Saratoga Div.	Theo. Voorhees		Troy, N. Y.
Delaware, Lackawanna & Western		G. W. B. Cushing	New York City.
Delaware, Lackawanna & Western	W. F. Hallstead		Scranton, Pa.
Bloomsburg Division	G. Bogart		Scranton, Pa.
Morris & Essex Division	Andrew Reasoner		Hoboken, N. J.
Oswego & Syracuse Division	W. B. Phelps		Oswego, N. Y.
Utica, Chenango & Sus. Div	W. G. Oakman		Scranton, Pa.
Delaware Western	David Connell		Wilmington, Del.
Denver & Rio Grande	S. R. Ainslie	S. R. Ainslie	Denver, Col.
Denver, South Park & Pacific	C. W. Fisher	Charles Wheeler	Denver, Col.
Des Moines, Adel & Western	C. N. Gilmore		Adel, Iowa.
Des Moines & Ft. Dodge	C. N. Gilmore	C. N. Gilmore	Des Moines, Ill.
Detroit & Bay City	S. R. Callaway	Allan Bourn	Detroit, Mich.
Detroit, Gr. Haven & Milwaukee	W. J. Morgan	John S. Lorimer.	Detroit, Mich.
Detroit, Hillsdale & Southwestern	W. F. Parker		Ypsilanti, Mich.
Detroit, Lansing & Northern	J. B. Mulliken	Allan Bourn	Detroit, Mich.
Dorchester & Delaware	J. M. Murphy		Cambridge, Md.
Dunkirk, Allegheny Val. & Pitts	D. Thayer		Dunkirk, N. Y.
Dunkirk, Allegheny Val. & Pitts		C. V. Deforest	New York City.
	E		
East Broad Top	A. W. Sims		Orbisonia, Pa.
East Alabama & Cincinnati	W. W. Barnes		Opelika, Ala.
East Line & Red River	W. B. Ward		Jefferson, Tex.
East Tenn., Virginia & Georgia	**J. F. O'Brien	J. F. O'Brien	Knoxville, Tenn.
Eastern	**D. W. Sanborn	Geo. J. Fisher	Boston, Mass.
Eastern Kentucky	H. W. Bates	H. W. Bates	Riverton, Ky.
Eastern Kentucky	Geo. Noble		Riverton, Ky.
Eastern Shore	W. Thompson		Prince Anne, Md.
Erie & Pittsburg	J. M. Kimball		Erie, Pa.
Erie & Pittsburg	*J. D. Layng	Wm. Mullins	Pittsburg, Pa.
Eureka & Palisade	P. Evarts		Palisade, Nev.
European & North American	F. W. Cram		Bangor, Maine.
Evansville & Terre Haute	J. E. Martin	Jno. L. White	Evansville, Ind.
Evansville, Terre Haute & Chi	Jos. Collett	W. D. Macfarland	Terra Haute, Ind.
	F		
Fitchburg	John Adams	F. S. Pratt	Boston, Mass.
Vermont & Mass. Div	‡E. K. Turner		Fitchburg, Mass
Flint & Pere Marquette	Sanford Keeler	G. C. Cook	E Saginaw, Mich.
Florida Central	W. M. Davidson	W. M. Davidson	Jacksonville, Fla.
Flushing, North Shore & Central	Samuel Spencer	Samuel Spencer	L'g Isl'd C'y, N. Y.
Fonda, Johnstown & Gloversville	L. Caten		Gloversville, N. Y.
Fon du Lac, Amboy & Peoria	A. Kinyon		Fond du Lac, Wis.
Fort Madison & Northwestern	S. B. Kenrick	S. B. Kenrick	Fort Madison, Ia
Fort Wayne & Jackson	M. D. Woodford	H. A. Raymond	Jackson, Mich.
Fort Wayne, Muncie & Cincinnati	W. W. Worthington & P. Ag't		Fort Wayne, Ind
Foxburg, St. Petersburg & Clarion	Benj. B. Newton		Foxburg, Pa.
Frankfort & Kokomo	E. Y. Comstock		Frankfort, Ind.
Fredericton	F. B. Edgecombe		Fredericton, N. B.
Freehold & New York	J. E. Ralph		Freehold, N. J.
	G		
Gal., Harrisburg & San Antonio	James Converse		Houston, Texas.
Gal., Houston & Henderson	*W. H. Harding	W. H. Harding	Palestine, Texas.
Geneva, Ithaca & Sayre	Wm. Stevenson		Sayre, Pa.
Georgia	S. K. Johnson	S. K. Johnson	Augusta, Ga.
Grand Haven	*F. H. May	F. H. May	Allegan, Mich.
G. Rapids, Newaygo & L. Shore	C. Warner		G. Rapids, Mich.
Grand Rapids & Indiana	W. O. Hughart, Pres't	W. R. Shelby.	G. Rapids, Mich.
Northern Division	J. M. Matheany		G. Rapids, Mich.
Southern Division	P. S. O'Rourke		Fort Wayne, Ind.
Grand Trunk	*J. Hickson	John Taylor	Montreal, Canada.
Grand Trunk	W. J. Spicer		Montreal, Canada.
Grand Tower & Carbondale	T. M. Williamson	Wm. W. Harris	Grand Tower, Ill.
Grayville & Mattoon	*G. L. Bradbury		Mattoon, Ill.
Grayville & Mattoon	G. R. Cobleigh		Mattoon, Ill.
Great Western (Canada)	Charles Stiff		Hamilton, Ont.
Great Western (Canada)		G. R. Nash	London, Ont.
Green Bay & Minnesota	*Timothy Case		Green Bay, Wis.
Greenville & Columbia	J. W. Fry		Columbia, S. C.
Greenville, Col. & Birmingham	E. P. Buell		Greenville, Miss.
Greenwich & Johnsonville	H. H. Warner		Greenwich, N. Y.
Gulf, Colorado & Santa Fé	O. H. Dorrance		Galveston, Texas.
Gulf, Western Texas & Pacific	M. D. Monserrate		Cuero, Texas.
	H		
Hamilton & Northwestern	*F. W. Cumberland		Hamilton, Ont.
Hannibal & St. Joseph	W. R. Woodward	T. L. Dunn	Hannibal, Mo.
Hannibal & St. Joseph	W. R. Woodward		Hannibal, Mo.
Eastern Division			Hannibal, Mo.
Western Division	W. C. Alberger		Kansas City, Mo.
Hanover Junction & Gettysburg	Henry A. Young		Hanover, Pa.
Harlem Extension South	*R. C. Root		Bennington, Vt.
Havana, Rantoul & Eastern	H. E. Bullock	H. E. Bullock	Rantoul, Ill.
Housatonic	L. B. Stillson	D. L. Draper	Bridgeport, Conn.
Houston, East & West Texas			Houston, Texas.
Houston & Texas Central	A. H. Swanson	A. H. Swanson	Houston, Texas.
Southern Division	M. G. Howe		Houston, Texas
Northern Division	G. A. Quinlan		Corsicana, Texas.
Huntingdon & Broad Top	Geo. F. Gage	S. B. Knight	Huntingdon, Pa.
	I		
Illinois Central	E. T. Jeffrey	O. Ott	Chicago, Ill.
Chicago Division	C. A. Beck		Centralia, Ill.
Northern Division	J. C. Jacobs		Amboy, Ill.

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
Iowa Division	D. W. Parker		Dubuque, Ia.
Springfield Division	T. J. Hudson		Springfield, Ill.
Illinois Midland	L. Genis, *Rec*	J. G. Clifford	Terre Haute, Ind.
Illinois & St. Louis	C. H. Sharman		St. Louis, Mo.
Indiana, Bloomington & Western	I. D. Barton	H. C. Norton	Indianapolis, Ind.
Indianapolis, Decatur & Spring.	H. S. Morse		Indianapolis, Ind.
Indianapolis & St. Louis	E. B. McClure	H. W. Comstock	Indianapolis, Ind.
Indianapolis, Peru & Chicago	§§E. C. Murphy		Indianapolis, Ind.
Indianapolis, Peru & Chicago		John Mc Kenna	Peru, Ind.
Indianapolis & Vincennes	J. J. Turner		Indianapolis, Ind
Intercolonial	D. Pottinger	L. B. Archibald	Moncton, N. B.
Halifax & St. John Division	Jas. Coleman		Truro, N. S.
Northern Division	M. Busby		Campbellt'n, N. B.
International & Great Northern	*H. M. Hoxie	H. M. Hoxie	Galveston, Texas.
Iowa Eastern	H. H. Kerr		Beulah, Iowa.
	J		
Jacksonville, N. Western & S. E.	E. S. Greenleaf		Jacksonville, Ill.
Jacksonville, Pen. & Mobile.		J. D. Hollister	Tallahassee, Fla.
Jeff., Madison & Indianapolis	E. W. McKenna		Louisville, Ky.
Jeff., Madison & Indianapolis		Wm. Mullins	Pittsburg, Pa.
Junction & Breakwater	Tho. Groome		Lewes, Del.
	K		
Kansas Central	W. A. Martin	W. A. Martin	Leavenworth, Kan.
Kan. City, Burlington & Santa Fe	James Houston		Burlington, Kan.
Kansas City, Fort Scott & Gulf	L. W. Towne	Geo. H. Nettleton	Kansas City, Mo.
Kansas City, Lawrence & South	L. W. Towne	Geo. H. Nettleton	Kansas City, Mo.
Kan. City, St. Joseph & C. Bluffs	J. F. Barnard		St. Joseph, Mo.
Kan. City, St. Joseph & C. Bluffs.	*G. H. Nettleton		Kansas City, Mo.
Kansas City & Eastern	H. Hale		Independence, Mo
Kansas Pacific	*S. H. H. Clark	A. D. Clark	Omaha, Neb.
Kansas Pacific	S. T. Smith		Kansas City, Mo.
Kaw Valley Division	J. O. Brinkerhoff		Kansas City, Mo.
Smoky Hill Division	J. T. Odell		Ellis, Kansas.
Denver Division	J. T. Odell		Denver, Col.
Cheyenne Division	A. A. Egbert		Denver, Col.
Kent Co. & Smyrna & Del. Bay	J. F. Bingham		Chestertown, Md.
Kentucky Central	J. R. Ledyard		Covington, Ky.
Kingston & Pembroke	B. W. Folger	Wm. Harty	Kingston, Can.
Knox & Lincoln	C. A. Coombs	C. A. Coombs	Bath, Maine.
Knoxville & Ohio	G. J. Kinzel		Knoxville, Tenn.
	L		
Lake Erie & Western	*E. H. Waldron	E. H. Andress	Lafayette, Ind.
Eastern Division	D. S. Hill		Fremont, Ohio.
Western Diuision.	M. Clark		Lafayette, Ind.
Lake Ontario Southern	*Jas. E. Briggs		Newark, N. Y.
Lake Shore & Mich. Southern	*John Newell		Cleveland, Onio.
Lake Shore & Mich. Southern	Charles Paine	A. C. Armstrong	Cleveland, Ohio.
Buffalo & Erie Division	C. B. Couch		Clevelahd, Ohio.
Toledo Division	Thos. Flesher, Jr		Cleveland, Ohio.
Michigan Division	J. E. Curtis		Toledo, Ohio.
Detroit Division	P. S. Blodgett		Detroit, Mich.
Western Division	J. H. Parsons		Chicago, Ill.
Lansing Division	T. J. Charlesworth		Lansing, Mich.
Franklin Division	Geo. H. McIntire		Stoneboro, Pa.
Lehigh Valley	Robert H. Sayre		Bethlehem, Pa.
Lehigh Valley		L. Chamberlin	Philadelphia, Pa.
Beaver Meadow Division.	A. G. Brodhead, Jr		Mauch Chunk, Pa
Mahanoy Division	James I. Blakslee		Mauch Chunk, Pa.
New Jersey Division	H. E. Packer		Metuchen, N. J.
Wyoming Division	A. Mitchell		Wilkesbarre, Pa.
Levis & Kennebec	W. C. Hall		Quebec, Can.
Ligonier Valley	Thos. A. Mellon		East Liberty, Pa.
Little Rock & Fort Smith.	T. Hartman		Little Rock, Ark.
Little Rock, Miss. River & Texas	J. A. Woodson	J. A. Woodson	Pine Bluff, Ark.
Los Angeles & Independence	§W. J. L. Moulton		Los Angeles, Cal.
Long Island	T. R. Sharp, Rec	R. M. Galloway	L'g Isla'd C'y, N.Y
Louisville & Nashville	*F. de Funiak		Louisville, Ky.
Louisville & Nashville	D.W. C. Rowland	G. C. Breed	Louisville, Ky.
St. L. & S. E. & N. & D. Div.	James Montgomery		St. Louis, Mo.
Memphis Line	J. T. Harrahon		Memphis, Tenn.
Nashville & Decatur Div	James Geddes		Nashville, Tenn.
So. & North Ala. Division	B. Dunham		Birmingham, Ala.
Louisville, Cincinnati & Lexington	Wm. Mahl	Wm. Mahl	Louisville, Ky.
Louisville, New Albany & Chicago	J. MacLeod	Wm. M. Lewis	Louisville, Ky.
Louisville, N. Albany & St. Louis	H. L. Shepherd		New Albany, Ind.
	M		
Macon & Brunswick	Jas. M. Edwards	W. C. Jones	Macon, Ga.
Maine Central	Payson Tucker		Portland, Me.
Manchester & Keene	Charles E. Paige		Nashua, N. H.
Manchester & Lawrence	H. E. Chamberlin		Concord, N. H.
Manchester & North Weare	H. E. Chamberlin		Concord, N. H.
Manhattan Beach	A. Corbin, *Pres't*		New York, N. Y.
Manhattan Elevated	§§Frank K. Hain	M. K. King	New York, N. Y.
Eastern Division	Robert Stewart		New York, N. Y.
Western Division			New York, N. Y.
Marietta & Cincinnati	Jas. H. Stewart.	J. H. Stewart	Cincinnati, O.
Marquette, Hought'n & Ontonag'n	*Samuel Schoch		Marquette, Mich.
McKean & Buffalo	S. V. Godden		Smethport, Pa.
Memphis & Little Rock	*Rudolph Fink		Memphis, Tenn.
Memphis & Little Rock	W. E. Smith		Memphis, Tenn.
Memphis & Charleston	John A. Grant	John A. Grant	Huntsville, Ala.
Memphis, Paducah & Northern	*N. Monsarrat	N. Monserrat	Paducah, Ky.
Michigan Air Line	*M. S. Hadley		Romeo, Mich.
Michigan Central	*H. B. Ledyard	Allan Bourn	Detroit, Mich.
Michigan Central	‡E. C. Brown		Jackson, Mich.
Mackinaw & Saginaw Div	W. A. Vaughan		Bay City, Mich.
Main L'e & G. R. & Kal. Div's	C. B. Bush		Jackson, Mich.
Middleburg & Schoharie	P. S. Demforth		Middleburg, N. Y.
Middletown & Crawford	D. Thompson		[Thompson, Ridge, N. Y
Midland Railway of Canada	H. G. Taylor		Port Hope, Ont.
Milwaukee, Lake Shore & West'n	H. G. H. Reed		Milwaukee, Wis.
Mineral Point	G. W. Cobb	G. W. Cobb	Mineral Point, Wis.
Mineral Range	*C. E. Holland		Hancock, Mich.
Minneapolis & St. Louis	*Chas. F. Hatch	Chas. F. Hatch	Minneapolis, Minn.
Minneapolis & St. Louis	E. W. Gaylord	E. W. Gaylord	Minneapolis, Minn.
Minnesota Midland	J. H. Lakey		Wabasha, Minn.
Mississippi & Tennessee	M. Burke	M. Burke	Memphis, Tenn.
Missouri, Iowa & Nebraska	Col. Henry Hill	J. FitzHenry	Alexandria, Mo.
Missouri, Kansas & Texas	*Abram Mitchell	G. M. Babcock	Sedalia, Mo.
Sedalia, Ft. S., & Neosho Div.	L. Pearson		Sedalia, Mo.
Cherokee & Choctaw Div	E. Harding		Denison, Tex.
Missouri Division	Geo. H. Huntington		Hannibal, Mo.
Fort Scott Division	L. Pearson		Sedalia, Mo.
Missouri Pacific	A. A. Talmage	R. B. Lyle	St. Louis, Mo.
Missouri Pacific	‡A. W. Dickinson		St. Louis, Mo.
Eastern Division	Miller Bullard		St. Louis, Mo.
Central Branch Division	W. W. Fagan		St. Louis, Mo.
Western Division	Warder Cumming		Sedalia, Mo.
Mobile & Alabama Grand Trunk	F. B. Clark, Prest		Mobile, Ala.
Mobile & Ohio	*A. L. Rives	A. L. Rives	Mobile, Ala.
Northern Division	E. S. Hosford		Jackson, Tenn.
Southern Division	C. Fleming		Mobile, Ala.
Mobile & Girard	W. L. Clark		Columbus, Ga.
Mobile & Montgomery	B. Dunham		Montgomery, Ala.
Mont Alto	G. B. Weistling		Mont Alto, Pa.
Montgomery & Eufaula	W. G. Raoul		Macon, Ga.

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
Montpelier & Wells River	W. A. Stowell		Montpelier, Vt.
Montrose	J. I. Blakslee	J. I. Blakeslee	Mauch Chunk, Pa
Morgan's Louisiana & Texas	Geo. Pandeley	C. A. Whitney & Co.	New Orleans, La.
Muncy Creek	H. R. Mehrling		Hughesville, Pa.
N			
Nashua, Acton & Boston	H. E. Chamberlin		Concord, N. H
Nashua & Lowell	Chas. E. Paige	Chas. E. Paige	Nashua, N. H.
Nashville, Chattanooga & St. Louis	J. C. Wrenne		Nashville, Tenn.
Natchez, Jackson & Columbus	J. H. Fitzpatrick		Natchez, Miss.
Naugatuck	Geo. W. Beach	Geo. W. Beach	Waterbury, Conn.
Nebraska	Wm. Irving		Omaha, Neb.
Newburg, Dutchess & Connecticut	C. L. Kimball	C. L. Kimball	Dutchess J'n, N. Y.
New Brunswick & Canada	John Stewart		St. Stephen, N. B.
New Brunswick	Tho. Hoben	T. Burpee	Gibson, N. B.
New Canaan	Wm. St. John		New Canaan, Conn.
New Castle & Franklin	A. Vandivort		New Castle, Pa.
New Haven & Derby	E. S. Quintard		New Haven, Conn.
New Haven & Northampton	C. N. Yeamans	C. N. Yeamans	New Haven, Conn.
New Jersey & New York	J. D. Hasbrouck		Jersey City, N. J.
New Jersey Midland	W. E. Lewis		Jersey City, N. J.
New Jersey Southern	W. S. Sneden		119 Lib. st., N. Y.
New Orleans & Selma	T. H. Du Puy		Selma, Ala.
New Orleans, Texas & Mobile	D. B. Robinson	John J. Howell	New Orleans, La.
New York, Lake Erie & Western	*Robert Harris		New York, N. Y.
New York, Lake Erie & Western	E. S. Bowen	J. A. Hardenbergh	New York, N. Y.
New York, Lake Erie & Western	‡O. Chanute		New York, N. Y.
New York, Lake Erie & Western	**P. P. Wright		Jersey City, N. J.
Eastern Division	E. O. Hill		Port Jervis, N. Y.
Delaware Division	Benj. Thomas		Port Jervis, N. Y.
Susquehanna Division	R. B. Cable		Elmira, N. Y.
Buffalo & Rochester Div	R. G. Taylor		Buffalo, N. Y.
Western Division	J. S. Beggs		Dunkirk N. Y.
New York & Greenwood Lake	†Wm. P. Harris		Jersey City, N. J.
New York, New Haven & Hartford	E. M. Reed	R. N. Dowd	New Haven, Conn.
N. Y. & N. H Division	John T. Moody		New York, N. Y.
Hartford Division	C. S. Davidson		Hartford, Conn.
Shore Line Division	W. H. Stevenson		New Haven, Conn.
New York Central & Hudson Riv			
Hudson River & Harlem Div	J. M. Toucey	C. V. DeForest	New York, N. Y.
Eastern Division	Zenas C. Priest		Utica, N. Y.
Western Division	Geo. H. Burrows		Rochester, N. Y.
New York Central Division	Jas. Tillinghast		Albany, N. Y.
New York & Harlem	Chas. M. Bissell	R. C. Moore	New York, N. Y.
New York & New England	*Jas. H. Wilson	W. W. McKim	Boston, Mass.
Eastern Division			Boston, Mass.
Norwich Division	P. St. M. Andrews		Norwich, Conn.
Western Division	J. T. McManus		Hartford, Conn.
New York, Ontario & Western	*Theo. Houston		New York, N. Y.
New York, Ontario & Western	N. R. Hankin	Charles Clark	Middletown, N. Y.
Northern Division	C. W. Lanpher		Norwich, N. Y.
Southern Division	A. H. Danforth		Middletown, N. Y.
New York, Penn. & Ohio	P. D. Cooper	J. H. Holway	Cleveland, O.
First & Second Divisions	A. L. Dunbar		Meadville, Pa.
Third and Fourth Divisions	T. A. Phillips		Galion, O.
Mahoning Division	J. M. Ferris		Cleveland, O.
Northern Pacific	*H. E. Sargent	E. T. Williams	St. Paul, Minn.
Northern Pacific	H. A. Towne		Brainerd, Minn.
Pacific & P. Oreille Div	J. W. Sprague	J. W. Sprague	New Tacoma, W. T.
Missouri Division	D. R. Taylor		Mandon Dak.
Northern of Canada	*F. W. Cumberland		Toronto, Can.
North Carolina	See Piedmont Air-Line.		
Northern Central	*Frank Thomson		Philadelphia, Pa.
Northern Central		A. W. Sumner	Baltimore, Md.
Baltimore Division	G. C. Wilkins		Baltimore, Md.
Elmira & Canandaigua Div	R. Neilson		Elmira, N. Y.
Susquehanna Division	W. A. Baldwin		Williamsport, Pa.
Northern (New Hampshire)	George F. Todd		Concord, N. H.
Northeastern (Georgia)	R. H. Bernard		Athens, Ga.
Northeastern (South Carolina)	J. F. Devine		Charleston, S. C.
North Pacific Coast	*John W. Doherty	W. F. Russell	San Francisco, Cal.
Northwestern Ohio	J. S. Morris		Toledo, O.
O			
Ogdensburg & Lake Champlain	W. W. Hungerford		Ogdensburg, N. Y.
Ohio Central	G. G. Hadley		Columbus, O.
Ohio & Mississippi	W. W. Peabody		Cincinnati, O.
Ohio & Mississippi		G. E. Atwood	St. Louis, Mo.
Eastern Division	C. B. Cole		Seymour, Ind.
Western Division	C. M. Stanton		St. Louis, Mo.
Louisville Division	C. Cole		Louisville, Ky.
Ohio & Toledo	N. A. Smith		Carrollton, O.
Old Colony	J. R. Kendrick	F. P. Moseley	Boston, Mass.
Northern Division	§S. A. Webber		Fitchburg, Mass.
Cape Cod Division	§C. H. Nye		Hyannis Mass.
Main Line Division	§J. H. French		Boston, Mass.
Olean, Bradford & Warren	J. W. Watson		Oleon, N. Y.
Omaha & Republican Valley	P. J. Nichols		Omaha, Neb.
Omaha & Northern Nebraska	J. E. House		Omaha, Neb.
Oregon & California	J. Brandt, Jr	J. Brandt, Jr	Portland, Oregon.
Oregon Railway & Navigation Co.	G. J. Ainsworth		Portland, Oregon.
Owensboro & Nasaville	E. Culverhouse		Owensboro, Ky.
P			
Paducah & Elizabethtown	Robert Meek		Elizabethtown, Ky.
Painesville & Youngstown	**J. A. Newcome		Youngstown, O.
Panama			Aspinwall, U. S. C.
Parker & Karns City	W. C. Moberly		Parker City, Pa.
Peach Bottom	S. M. Manifold		York, Pa.
Paw Paw & Toledo & South Haven	John Ihing		Lawton, Mich.
Pennsylvania	*Frank Thomson	Enoch Lewis	Philadelphia, Pa.
Pennsylvania	Charles E. Pugh		Altoona, Pa.
Pennsylvania	**John Reilly		Altoona, Pa.
New York Division	James McCrea		Jersey City, N. J.
Amboy Division	I. S. Buckelew		Camden, N. J.
Belvidere Division	J. A. Anderson		Lambertville, N. J.
New Jersey Division	F. Wolcott Jackson		Jersey City, N. J.
Philadelphia Division	W. F. Lockard		Philadelphia, Pa.
Middle Division	S. M. Prevost		Harrisburg, Pa
Pittsburg Division	Robert Pitcairn		Pittsburg, Pa.
Tyrone Division	S. S. Blair		Tyrone, Pa.
Bedford Division	Tho. A. Roberts		Harrisburg, Pa.
West Pennsylvania Division	E. B. Taylor		Allegheny City, Pa.
Lewistown Division	J. B. Hutchinson		Lewistown, Pa.
Pensacola & Selma	W. D. Chipley		Pensacola, Fla.
Peoria, Decatur & Evansville	G. R. Cobleigh	G. R. Cobleigh	Pekin, Ill.
Peoria, Pekin & Jacksonville	*Geo. Skinner	Geo. Skinner	Peoria, Ill.
Peoria & Springfield	J. R. Hilliard		Peoria, Ill.
Petersburg	R. Sully	L. E. Clark	Petersburg, Va.
Philadelphia & Atlantic City	Ellis Clark	Ellis Clark	Philadelphia, Pa.
Philadelphia & Reading	*J. E. Wootten	W. S. Wilson	Philadelphia, Pa.
Catawissa & Williamsport Br.	D. C. Reinhart		Williamsport, Pa.
Reading & Columbia	Alex. M. Wilson		Columbia, Pa.
Lebanon & Tremont	H. W. Tracy		Pine Grove, Pa.
N. Penn. & B. Brook Divis'n.	E. A. Sweigard		Philadelphia, Pa.
Philadelphia & Baltimore Central	Henry Wood	Henry Wood	Philadelphia, Pa.
Philadelphia & Erie	Wm. A. Baldwin		Williamsport, Pa.
Philadelphia & Erie		Enoch Lewis	Philadelphia, Pa.
Western Division	J. W. Reynolds		Erie, Pa.
Middle Division	E. B. Westfall		Renovo, Pa.
Eastern Division	Thomas Gucker		Williamsport, Pa.
Danv., Haz. & W. Barre Div	Joseph Crawford		Sunbury, Pa.
Philadelphia, Wilmington & Balt	H. F. Kenney		Philadelphia, Pa.
Philadelphia, Newt'n & New York	L. L. Bush		Philadelphia, Pa.
Piedmont Air-Line	T. M. R. Talcott	R. H. Duesberry	Richmond, Va.
Richmond & Danville Div	W. A. Green		Richmond, Va.
North Carolina Division	A. B. Andrews		Raleigh, N. C.
Pine River Valley & Stevens Pt	N. L. James		Richl'nd Cent., Wis.
Pittsburg & Castle Shannon	A. C. Hays		Pittsburg, Pa.
Pittsburg & Lake Erie	R. W. Jones		Pittsburg, Pa.
Pittsburg, Cincinnati & St. Louis	S. M. Felton, Jr	William Mullins	Pittsburg, Pa.
Pittsburg, Cincinnati & St. Louis	*D. W. Caldwell		Columbus, O.
Pitts., Cin. & St. Louis Div	J. H. Barrett		Pittsburg, Pa.
Col., Cin. & Ind., Cent. Div.	J. Hill		Logansport, Ind.
Col., Cin. & Ind., Cent. Div.	J. F. Miller		Richmond, Ind.
Indianap. & Vincennes Div	E. W. McKenna		Indianapolis, Ind.
Cincin. & Musk. Valley Div	C. C. Waite		Zanesville, O.
Little Miami Div	J. D. Ellison		Cincinnati, O.
Pittsburg, Ft. Wayne & Chicago	*J. D. Layng	William Mullins	Pittsburg, Pa.
Pittsburg, Ft. Wayne & Chicago	‡C. E. Gorham		Chicago, Ill.
Eastern Division	George S. Griscom		Pittsburg, Pa.
Western Division	C. D. Gorham		Fort Wayne, Ind.
Pittsburg & Western	G. A. Woerth		Harmony, Pa.
Pittsburg, Titusville & Buffalo	Tho. H. Wilson		Oil City, Pa.
Pittsburg, Titusville & Buffalo		John L. Awl	Pittsburg, Pa.
Pittsburg, Virginia & Charleston	J. M. Byers		Pittsburg, Pa.
Port Dover & Lake Huron	A. B. Atwater		Woodstock, Ont.
Port Royal & Augusta	R. G. Fleming		Port Royal, S. C.
Portland & Ogdensburg	Jonas Hamilton	Jonas Hamilton	Portland, Me.
Portland & Rochester	G. P. Wescott, *Rec*		Portland, Me.
Potomac, Fredericksb'h & Pied't	Charles Kennedy		Fredericksb'h, Va.
Poughkeepsie, Hartford & Boston	J. A. Perkins	A. W. Cable	Poughkeepsie, N. Y.
Prince Edward Island	Alex McNabb	Alex. McNabb	Charlottet'n, P. E. I.
Prospect Park & Coney Island	R. Schermerhorn		Coney Island, N. Y.
Providence & Springfield	William Tinkham	William Tinkham	Providence, R. I.
Providence & Worcester	W. E. Chamberlain		Providence, R. I.
Providence, Warren & Bristol	Waterman Stone		Providence, R. I.
Q			
Quebec, Mont., Ott'a & Occidental	L. A. Senecal	Jas. Macpherson	Montreal, Can.
Quebec Central	§A. Steele		Sherbrooke, Can.
Queen Anne & Kent County	P. H. Irwin		Centreville, Md.
Quincy, Missouri & Pacific	F. D. Schermerhorn		Quincy, Ill.
R			
Raleigh & Augusta Air-Line	J. C. Winder		Raleigh, N. C.
Raleigh & Gaston	J. C. Winder		Raleigh, N. C.
Rhinebeck & Connecticut	J. H. Jones		Rondout, N. Y.
Richmond, York Riv. & Chesap'ke	H. T. Douglas	B. S. Crouch	Richmond, Va.
Richmond & Danville	(See Piedmont Air-Line).		
Richmond, Frederick'h & Potomac	E. T. D. Myers	T. L. Courtney	Richmond, Va.
Richmond & Petersburg	Theo. D. Kline		Richmond, Va.
Rio Grande	*M. J. Gomila		Brownsville, Tex.
Rochester & State Line	J. E. Childs	J. E. Childs	Rochester, N. Y.
Rockwood & Tennessee River	H. Clay Evans		Rockwood, Tenn.
Rock Island & Mercer County	*R. R. Cable		Rock Island, Ill.
Rock Island & Peoria	R. R. Cable	R. R. Cable	Rock Island, Ill.
Rome	Eben Hillyer		Rome, Ga.
Rome, Watertown & Ogdensburg	E. A. Van Horne		Watertown, N. Y.
Rome, Watertown & Ogdensburg		G. W. B. Cushing	New York City.
Rumford & Buckfield	O. Hayford		Canton, Me.
S			
Scioto Valley	Joseph Robinson		Columbus, O.
St. Croix & Penobscot	Wallace Haycock		Milltown, Me.
St. Lawrence & Ottawa	†Tho. Reynolds	Tho. Reynolds	Ottawa, Can.
St. Johns	R. McLaughlin		St. Augustine, Fla.
St. Johns & Indian River	W. H. Churchill		Titusville, Fla.
St. John & Maine	H. D. McLeod		St. John, N. B.
St. Johnsbury & Lake Champlain	A. B. Jewett		St. Johnsbury, Vt.
St. Joseph & Des Moines	J. F. Barnard		St. Joseph, Mo.
St. Joseph & Western	L. D. Tuthill		St. Joseph, Mo.
St. Joseph & Western		A. D. Clarke	Omaha, Neb.
St. Louis, Alton & Terre Haute	Beriah Warren	Beriah Warren	St. Louis, Mo.
St. Louis, Hannibal & Keokuk	W. W. Walker		Hannibal, Mo.
St. Louis, Iron Mountain & South	Arthur W. Soper	W. S. Cuddy	St. Louis, Mo.
Texas Division	J. W. Brown		Texarkana, Texas
Missouri Division	Wm. Kerrigan		St. Louis, Mo.
St. Louis & San Francisco	*C. W. Rogers	C. W. Rogers	St. Louis, Mo.
Kansas Division	W. A. Thoms		Oswego, Kan.
St. Louis, Keokuk & Northwest'n	A. L. Griffin	John A. Blood	Keokuk, Ia.
St. Louis, Salem & Little Rock	E. B. Sankey		Salem, Mo.
St. Louis, Salem & Little Rock		H. A. Crawford	St. Louis, Mo.
St. Paul & Duluth	Geo. H. Smith		St. Paul, Minn.
St. Paul, Minneapolis & Manitoba	*Jas. J. Hill	J. C. Morrison	St. Paul, Minn.
St. Paul, Minneapolis & Manitoba	E. B. Wakeman		St. Paul, Minn.
St. Paul & Sioux City	E. W. Winter		St. Paul, Minn.
St. Paul, Stillwater & Taylor's Falls			St. Paul, Minn.
Sacramento & Placerville	Josiah Johnson		Sacramento, Cal.
Saginaw Valley & St. Louis	N. W. Merrill	N. W. Merrill	Saginaw, Mich.
San Francisco & North Pacific	*A. Hughes	A. Hughes	San Francisco, Cal.
San Francisco & North Pacific	A. A. Bean	P. E. Dougherty	Petaluma, Cal.
San Rafael & San Quentin	David Nye		San Rafael, Cal.
Savannah, Florida & Western	*H. S. Haines	W. B. McKee	Savannah, Ga.
Savannah & Memphis	W. S. Greene	W. S. Greene	Opelika, Ala.
Seaboard & Roanoke	J. M. Robinson	J. A. Walton	Baltimore, Md.
Selma & Greensboro	A. M. Fowlkes		Selma, Ala.
Selma, Rome & Dalton	Norman Webb	Norman Webb	Selma, Ala.
Sheboygan & Fond du Lac	E. J. Cuyler		Fond du Lac, Wis.
Shenango & Allegheny	J. T. Blair		Greenville, Pa.
Shepaug	C. H. Platt		Litchfield, Conn.
Sioux City & Pacific	F. C. Hills		Missouri Valley, Ia.
Sioux City & Pacific	*P. E. Hall	P. E. Hall	Cedar Rapids, Ia.
Skaneateles	J. McNamara		Skaneateles, N. Y.
South Carolina	John P. Peck	S. B. Pickens	Charleston, S. C.
Southeastern of Canada	H. A. Alden		Newport, Vt.
Southern Central	Jas. G. Knapp		Auburn, N. Y.
South Mountain	W. H. Woodward		Pine Grove Furnace, Pa.
Southern Pacific	A. C. Bassett	John R. Watson	San Francisco, Cal.
Los Angeles & Yuma Div	§E. E. Hewitt		Los Angeles, Cal.
Tulare Division			Oakland, Cal.
South Pacific Coast	Thomas Carter		San Francisco, Cal.
Southwestern of Georgia	W. G. Raoul		Macon, Ga.
Southwestern of Kentucky	M. Tabler		Harrodsburg, Ky.
Spartanburg, Union & Columbia	Jas. Anderson	Jas. Anderson	Spartanburg, S. C.
Spartanburg & Asheville	Jas. Anderson	Jas. Anderson	Spartanburg, S. C.
Springfield, Athol & Northeastern	John W. Phelps		Springfield, Mass.
Springfield & Northwestern	*Geo. N. Black	J. A. Williams	Springfield, Ill.
Springfield Southern	Wm. Thornburg	G. A. Barnes	Springfield, O.
Springfield & Western Missouri	T. F. Oakes		Kansas City, Mo.
Springhill & Parsboro	J. A. Killam		Parsboro, N. S.
State Line & Sullivan	J. O. Blight		Towanda, Pa.
Staten Island	John W. Wilber		Tottenville, N. Y.
Sterling Mountain	J. C. Missimer		Sloatsburg, N. Y.
Stonington & Providence	J. B. Gardiner		Providence, R. I.
Stonington & Providence		Giles F. Ward	Stonington, Conn.
Summit Branch	R. C. Peebles		Lykens, Pa.
Summit County	W. M. Riter		Coalville, Utah.
Sussex	E. C. Case	E. C. Case	Newtown, N. J.
Syracuse, Binghamton & N. Y	W. K. Niver		Syracuse, N. Y.
Syracuse, Binghamton & N. Y		G. W. B. Cushing	New York, N. Y.
Syracuse, Chenango & New York	A. C. Belden		Syracuse, N. Y.
Syracuse, Geneva & Corning	A. H. Gorton		Corning, N. Y.

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
T			
Tennessee & Pacific	J. W. Thomas		Nashville, Tenn.
Terre Haute & Ind'apolis } Vandalia Line.	*John E. Simpson		St. Louis, Mo.
Terre Haute & Ind'apolis	Joshua Staples		Indianapolis, Ind.
Terre Haute & Ind'apolis		C. R. Peddle	Terre Haute, Ind.
Logansport Division			Logansport, Ind.
Terre Haute & Southeastern	George Atherton		Terre Haute, Ind.
Texas & New Orleans	C. A. Burton	P. B. Watson	Houston, Tex.
Texas & Pacific	Geo Noble	Geo. Noble	Marshall, Tex.
Jefferson Division	J. S. Noble		Texarkana, Tex.
Southern Division	C. Harris		Marshall, Tex.
Texas Western	J. W. Goodwin		Houston, Tex.
Tioga & Elmira State Line	L. H. Shattuck		Elmira, N. Y.
Toledo, Delphos & Burlington	*Jas. Irvine		Delphos, O.
Toledo Division	I. H. Burgoon		Delphos, Ohio.
Dayton Division	J. O. Arnold		Dayton, Ohio.
Toledo & Ann Arbor	J. S. Morris		Ann Arbor, Mich.
Toledo, Peoria & Western	W. F. Merrill	W. F. Merrill	Peoria, Ill.
Troy & Boston	E. E. Aldrich	D. Robinson	Troy, N. Y.
Toronto, Grey & Bruce	*Edmund Wragge	W. Watson	Toronto, Can.
Toronto & Nipissing	John Duncan	John Symons	Toronto, Can.
Tuckerton	J. J. Pharo	J. C. Ridgeway	Tuckerton, N. J.
U			
Ulster & Delaware	Geo. Coykendall		Rondout, N. Y.
Union Pacific	*S. H. H. Clarke	A. D. Clark	Omaha, Neb.
Union Pacific	§Jas. T. Clarke		Omaha, Neb.
Eastern Division	P. J. Nichols		Omaha, Neb.
Western Division	W. B. Doddridge		Evanston, Wy. T.
Mountain Division	Robert Law		Cheyenne, Wy. T.
Laramie Division	Edw. Dickinson		Laramie, Wy. T.
Colorado Division	A. A. Egbert		Denver, Col.
Union Railway & Transit Co	J. B. Van Dyne	E. J. Williams, Jr	St. Louis, Mo.
Union R. R. Trans. & S. Yard Co	*M. A. Downing	**Albert Scott	Indianapolis, Ind.
Utah Central	John Sharp	S. H. Hill	Salt Lake City.
Utah Northern	Geo. W. Thatcher		Logan, Utah.
Utah Western	*W. W. Riter	W. W. Riter	Salt Lake City.
Utica & Black River	J. F. Maynard		Utica, N. Y.
Utica, Ithaca & Elmira	Geo. J. Rice	J. L. Greatsinger	Horse Heads, N. Y
V			
Vicksburg & Brunswick	W. G. Raoul		Macon, Ga.
Vermont Valley	John Mulligan		Springfield, Mass.
Vicksburg & Meridian	E. F. Raworth	E. F. Raworth	Vicksburg, Miss.
Vicksburg, Shreveport & Pacific	*J. W. Green	J. W. Green	Monroe, La.
Virginia & Truckee	H. M. Yerington	C. P. Mason	Carson, Nev.
W			
Wabash, St. Louis & Pacific	*John C. Gault		St. Louis, Mo.
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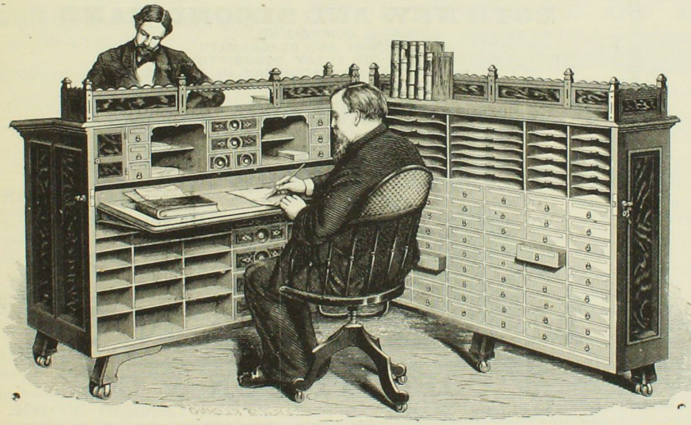

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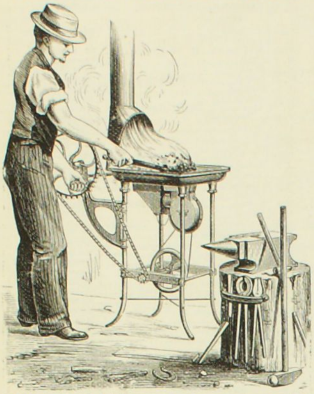

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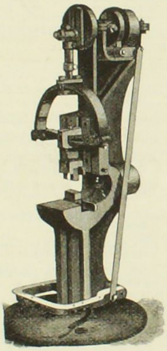

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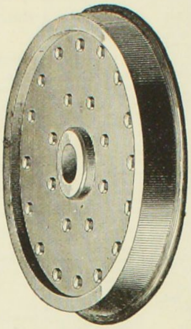

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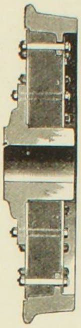

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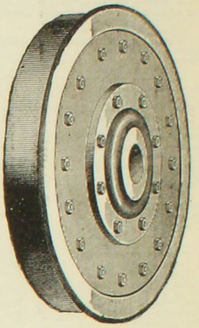

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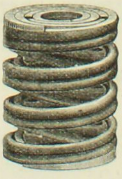

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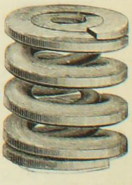

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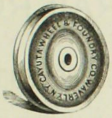
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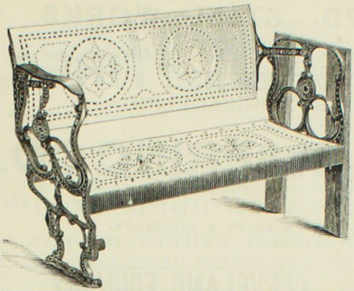

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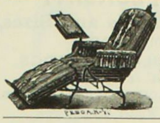

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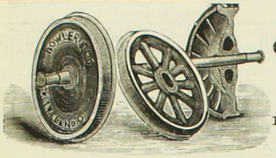
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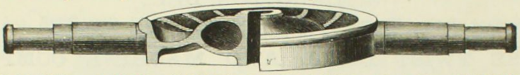

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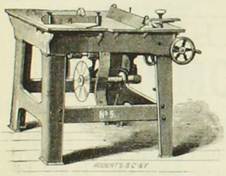

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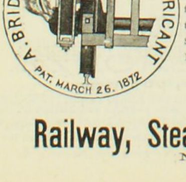

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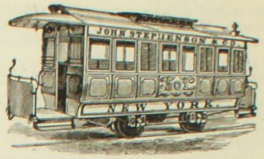

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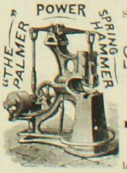

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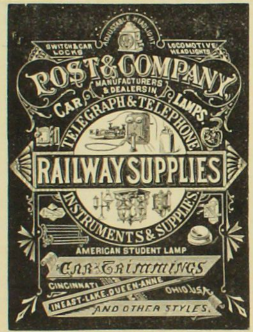

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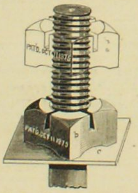

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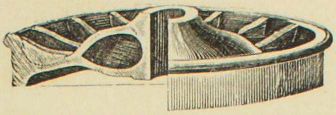

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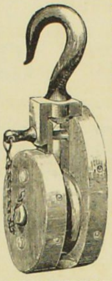

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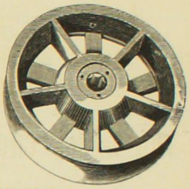

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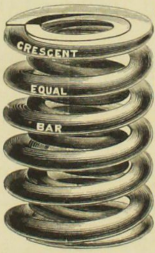

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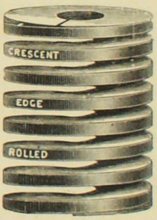

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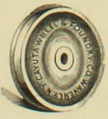
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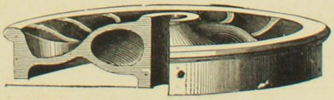

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